Physical Constraint Editor User Manual

(2021.4 Version 2.6)

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1. FEATURES

1.1 Introduction to PCE

This document describes in detail the usage and functions of Physical Constraint Editor (hereafter referred to as PCE). PCE can perform layout constraints, area constraints, and I/O settings on instances and IOs.

PCE main interface, as shown in the figure below.

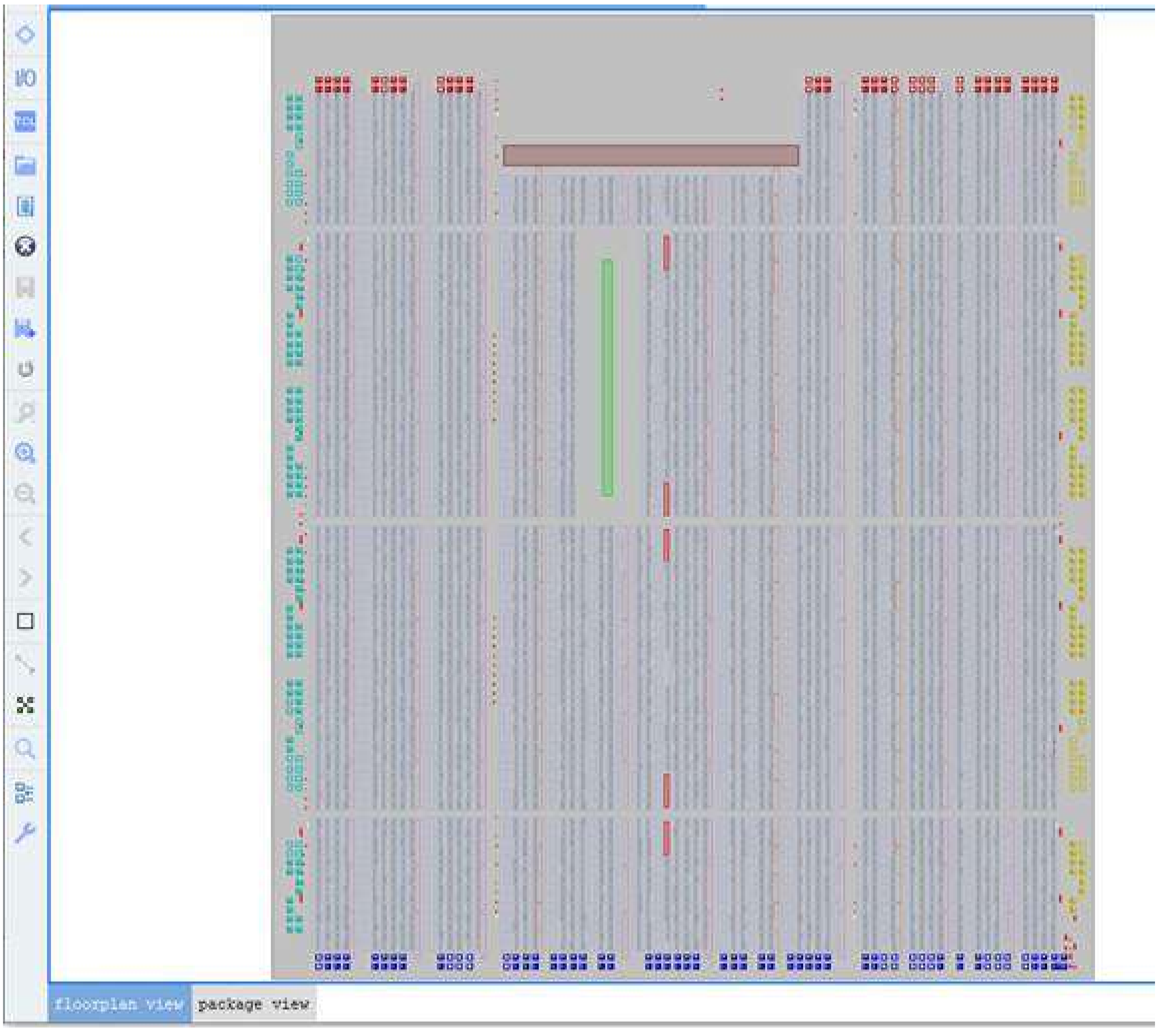


Figure 1 -1 PCE main interface

1.2 Start PCE

Open the software, create a new project, and add add.vm (in the directory where FAB is installed). There are two ways to start PCE :

1.2.1 Open PCE in PDS

(1) Click the Physical Constraint Editor icon on the toolbar, as shown in the figure below.

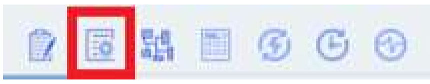


Figure 1-2 The Physical Constraint Editor icon in the toolbar

(2) Click "Physical Constraint Editor (Post-Map)" under "Tools" in the menu bar, as shown in the figure below.

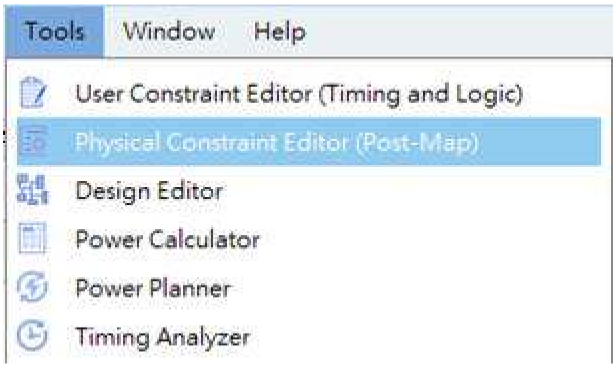


Figure 1-3 Physical Constraint Editor (Post-Map) under the Tool menu

When starting PCE in PDS, if there is no Physical Constraint File (hereinafter referred to as PCF) file in the original PDS project, a dialog box for inputting a PCF file will pop up, and the content of the text box is empty, as shown in the figure below.

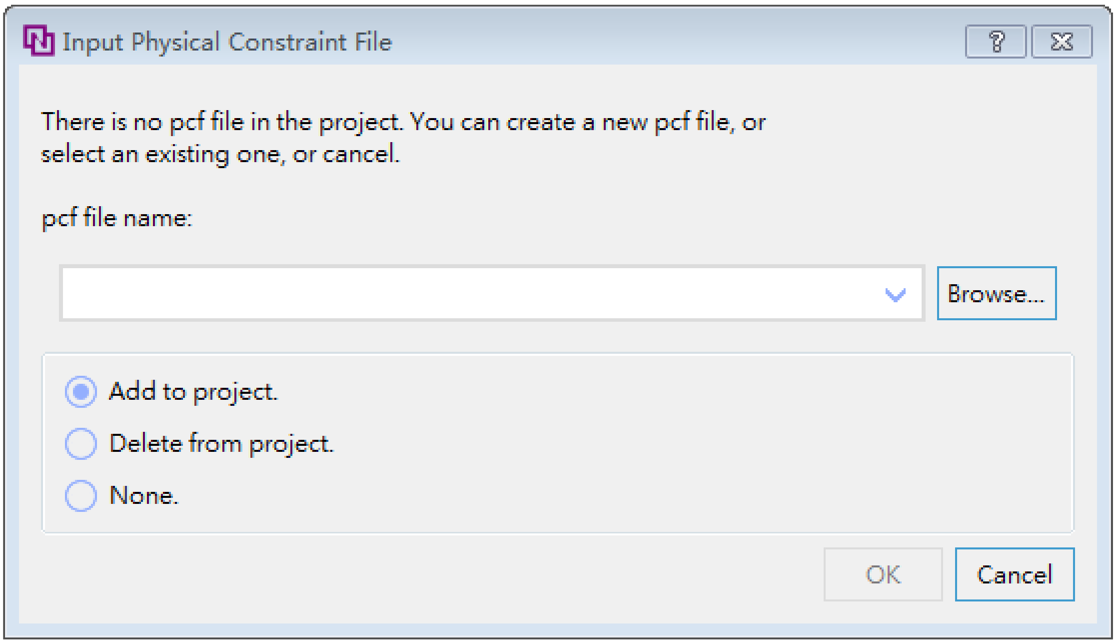


Figure 1-4 Input Physical Constraint File without PCF file in PDS

When there is a PCF file in the original PDS project, the text box content of the pop-up input PCF

file dialog box is the existing PCF file in the project, as shown in the figure below.

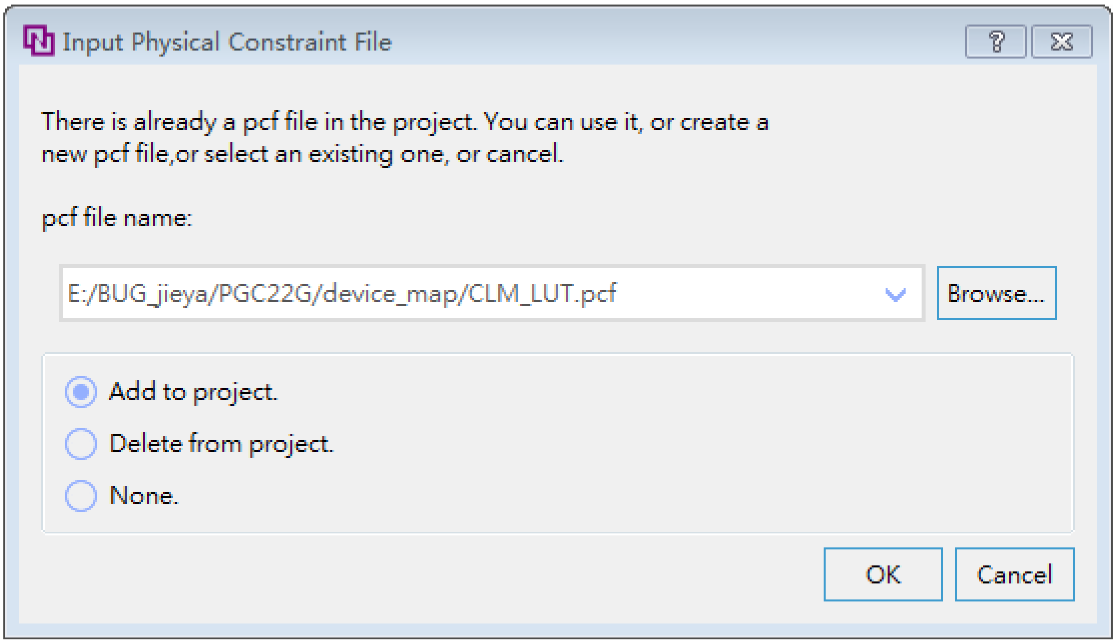


Figure 1-5 Input Physical Constraint File with PCF file in PDS

【Add add Replace project pcf.】: After checking, you can directly input the name of the PCF file to be created or select an existing PCF file to add to the PDS project, then click the 【OK】 button to load the PCF file into PCE. If the input is a legal PCF file name that does not exist, a PCF file with this name will be created in the working directory after clicking the 【OK】 button (you can add the suffix manually. Then the software will automatically add the suffix.pcf) when creating a new PCF file. If the selected PCF is inconsistent with the original PCF file in the project, the selected PCF file will replace the original PCF file in the project and affect the status of the PDS project. If the text box is empty, the 【OK】 button will not be available

【Delete pcf from project and exit.】: Remove the existing PCF files in the PDS project, and the opened PCE will not load any PCF files. If there is no PCF file in the PDS project, select this option, 【OK】 will not be available.

If the selected PCF file has an error, it will report an error, but you can still enter the PCE to give the user a chance to modify it; and in the pnr stage, if there is an error in the PCF, it will report an error and terminate the execution of the flow.

1.2.2 Open PCE separately in the installation directory

Click the phyconstraint_editor.exe executable file in the bin folder of the installation directory to start PCE. In this way of starting PCE separately, the user needs to manually select the Map DB file to be loaded, as shown in the figure below.

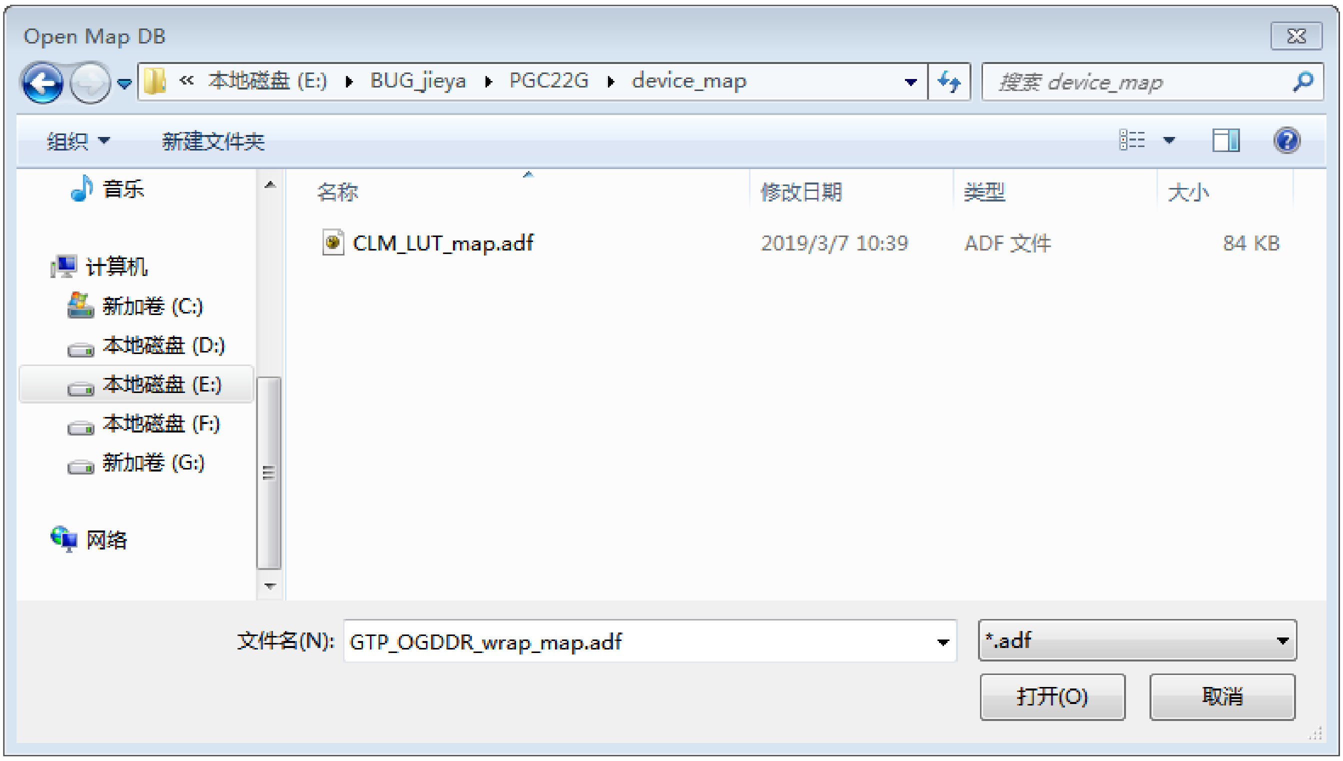


Figure 1-6 Select the Map DB file to be loaded

2. INTRODUCTION TO THE MENU TOOLBAR

2.1 Toolbar introduction

2.1.1 File related operations

File- related operations in the toolbar are shown in the figure below.



Figure 2-1 File related operations in the toolbar

The File- related operations in the figure are described as follows:

Add PCF File : Select the PCF file that needs to be loaded into PCE.

Open PCF File As Text : Open PCF files in PCE 's Text Editor

Remove PCF File : Remove the currently used PCF file from PCE.

Save : Save the constraints to PCE 's PCF file.

Save as : Save the constraint to the specified directory with the current file name or rename it, and open the newly saved PCF file in PCE at the same time.

Reset : Clear all constraint settings in PCE.

2.1.2 View related operations

View- related operations in the toolbar are shown in the figure.

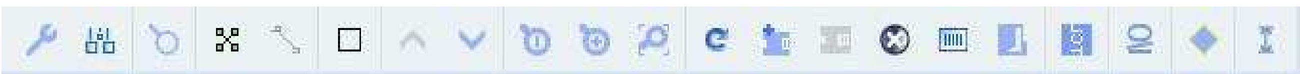


Figure 2-2 View related operations in the toolbar

The operations represented by the buttons from left to right in the figure are as follows:

Design Browser : Show / hide the Design Browser window.

Mark Browser : Show / hide the Mark Browser window.

I/O Table : Show / hide the I/O Table window.

TCL : open / hide the command line console.

Add PCF File: Add pcf

Remove PCF File : delete pcf

Save : save

Save as : save as

Reset : Reset

View All : Displays the full view.

Zoom In : Zooms in on the view.

Zoom Out : Zooms out the view.

Previous View : Previous view.

Next View : Next view.

Region Mode : Turn on / off the region constraint mode.

Show Differential IO : Show / hide differential IO in package view.

Show Airline : PCE floorplan interface displays design inst Connection relationship after position constraint

Search : Open the device instance search box on the Device interface.

View ALL Widget : This window can display the position of the chip on the device view interface and the selected design net in real time. This window is displayed in the lower right corner of the device view interface by clicking the button between the scroll bars

Setting : divided into two pages,

The layers page can be displayed or hidden through the corresponding buttons on the toolbar: there are three types,

Design, Device, I/ O Banks. The three types are constrained object, device on hardware, and I/O on hardware. If the previous state of the corresponding type is selected, it means that this type is displayed in the floorplan view/package view. If it is not selected, it means that this type will not be displayed in floorplan view/package view.

In addition, in the Device window, there are four types of pin options: Clock Pad, Ref Pin, Share Pin, and PLL Pad, which represent four different types of pins (when the interface is opened, the four types are unchecked by default). Check a certain type, and then draw the corresponding identified pins in the Package View (in the Package View drawing, C means Clock Pad, R means Ref Pin, S means Share Pin, P means PLL Pad).

the General page, there is a configuration item - Add comment to error cmds, which is not checked by default. When this box is checked, when PCE is activated to save, pcf will comment out the wrong and invalid constraint commands and print the report information on the console ; unchecked When selected, when PCE is activated and saved, errors and invalid constraint commands will not be annotated in pcf and the report information will be printed on the console

2.2 Right-click menu introduction

2.2.1 Toolbar right-click menu

Right-click the blank area of the toolbar, and the right-click menu will appear as shown in the figure below.

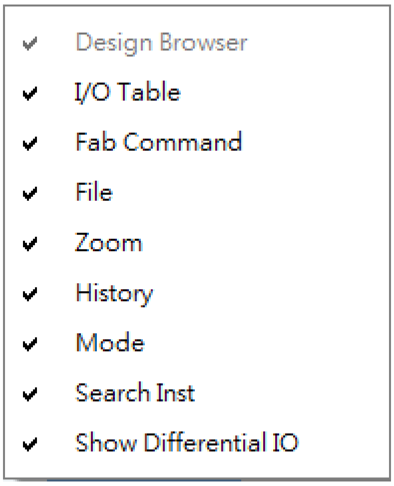


Figure 2-3 The right-click menu of the PCE toolbar

Design Browser : Show / hide the Design Browser button.

I/O Table : Show / hide the I/O Table button.

Fab Command : Show / Hide PCE Command button.

File : Show / hide buttons for File- related operations on the toolbar.

Zoom : Show / hide the toolbar View All, Zoom In, Zoom Out icons.

History : Show / hide the icons of Previous View and Next View in the toolbar.

Mode : Show / hide the Region Mode icon in the toolbar.

Search Inst : Show / hide the search box button.

Show Differential IO : Show / hide the Differential IO button.

2.2.2 Title right-click menu

Right-click on the title, and the right-click menu will appear, as shown in the figure.

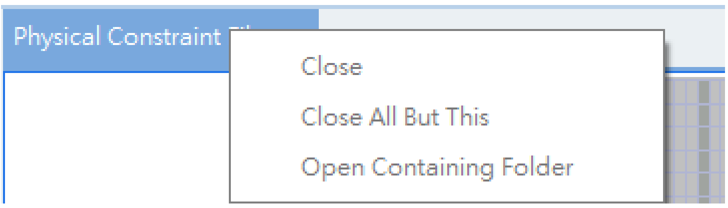


Figure 2-4 Right-click menu of PCE title bar

Close : Close the current window.

Close All But This : Close all other windows except the current one.

Open Containing Folder : Open the folder where the PCF file is located.

3. WINDOW INTRODUCTION

The functions and usage of each window are introduced in detail below.

3.1 Resource BrowserDesign Browser

The Design window sorts and displays all current instances. There are mainly categories such as Primitives, IO, CarryChain, and Group. You can find specific instances and IOs in the Design window, or click on the type name and drag it to the Floorplan view or Package view window on the right for constraints.

The Device window displays hardware information, mainly Design, Device, and I/O Banks. The three types are constrained object, device on hardware, and I/O on hardware. If the previous state of the corresponding type is selected, it means that this type is displayed in the floorplan view/package view. If it is not selected, it means that this type will not be displayed in floorplan view/package view.

In addition, in the Device window, there are four types of pin options: Clock Pad, Ref Pin, Share Pin, and PLL Pad, which represent four different types of pins (when the interface is opened, the four types are unchecked by default). Check a certain type, and then draw the corresponding identified pins in the Package View (in the Package View drawing, C means Clock Pad, R means Ref Pin, S means Share Pin, P means PLL Pad).

Design Browser window as shown below.

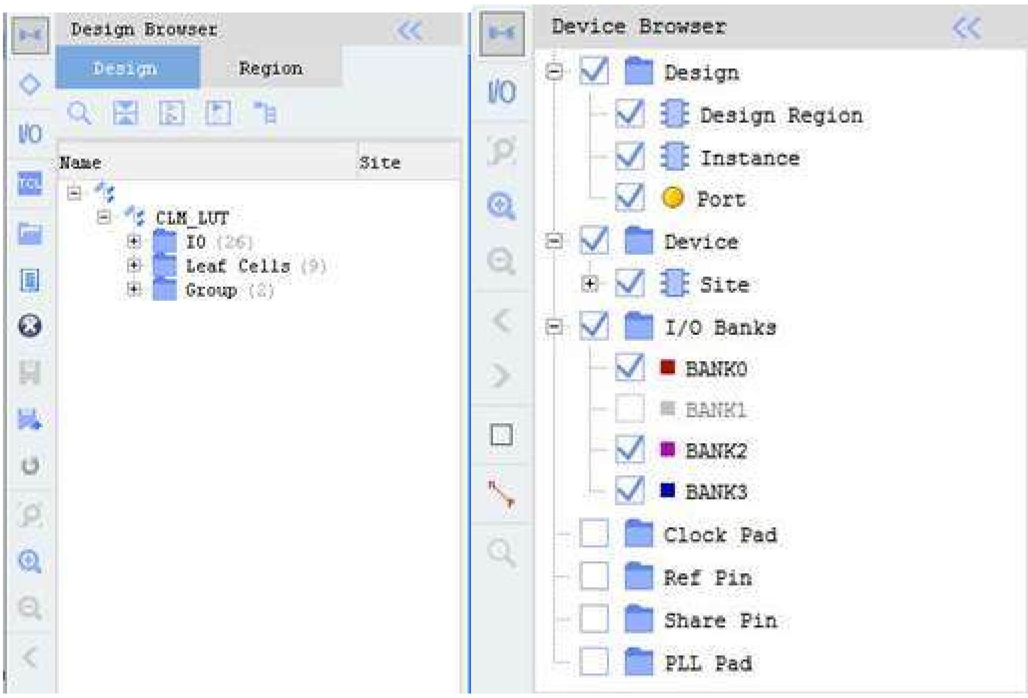


Figure 3-1 Design Browser

There is a toolbar in the Design window as shown in the figure below:



Figure 3-2 DesignToolbar

Among them: the first Search : the search function, as shown in the figure below:

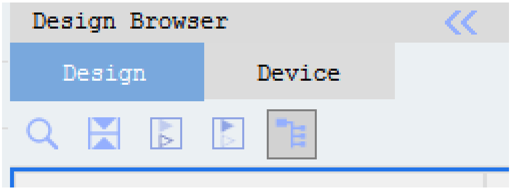


Figure 3-3 Search function

The second Collapse All : Collapse function

The third Hide Constraint : Hide constrained instances. As shown below:

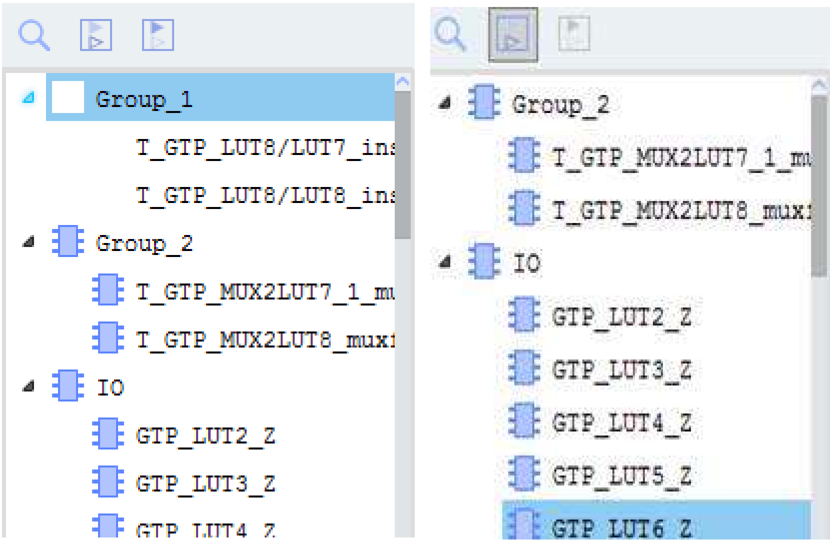


Figure 3-4 Unhidden constrained instance and hidden constrained instance

The fourth Hide UnConstraint : Hide unconstrained instances. As shown below:

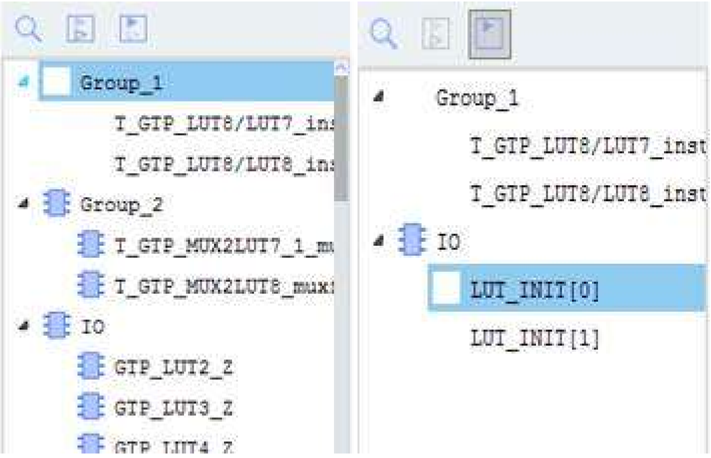


Figure 3-5 Unhidden Unconstrained Instances and Hidden Unconstrained Instances

The fifth Show By hierarchy : Whether to display the hier hierarchy. As shown below:

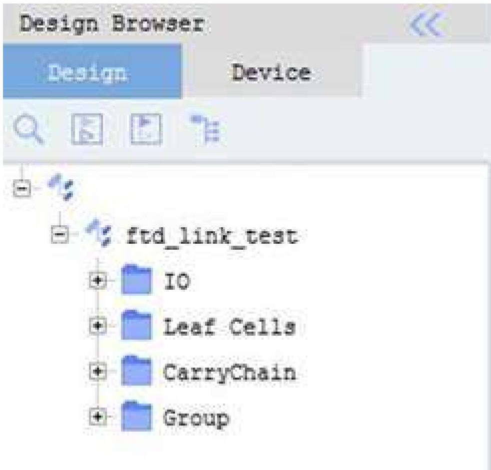


Figure 3-6 No display of Hier structure

In addition to displaying the design name and its structure, the Design Browser can also view the constraint site information, which supports editing.

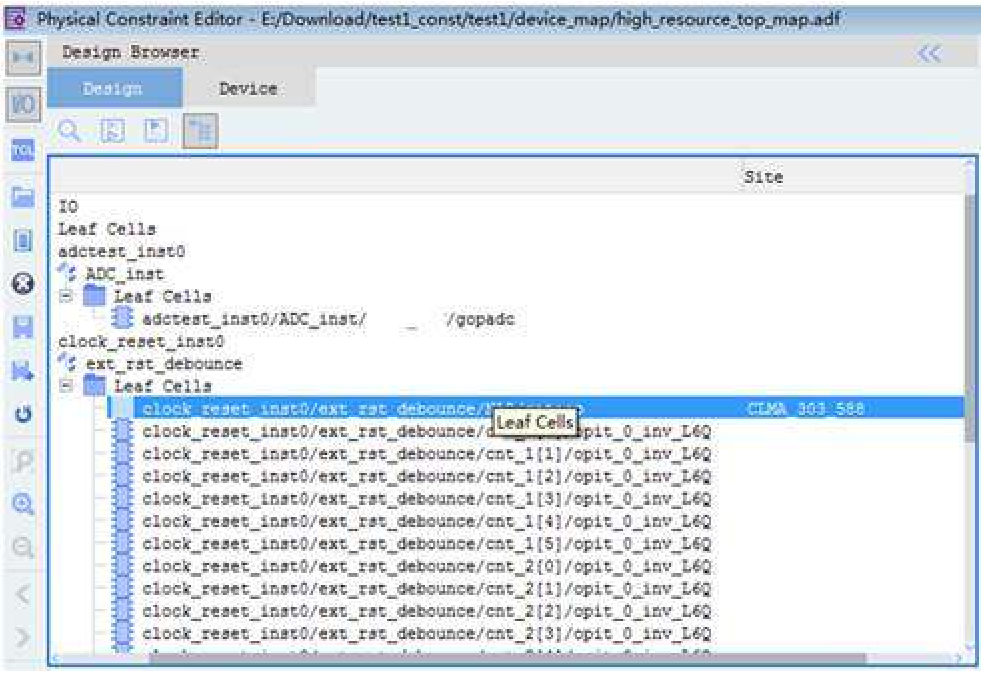


Figure 3-7 siteEdit

For the selected module, right-click to add support for Locate to device, click to jump and highlight all the location constraints on the floorplan ; Add to Region, support the instance under the module to be constrained to the selection area (if an instance already has constraints, ignore the instance) ; Remove from Region supports unconstraining the instance in the module constrained in a certain region.

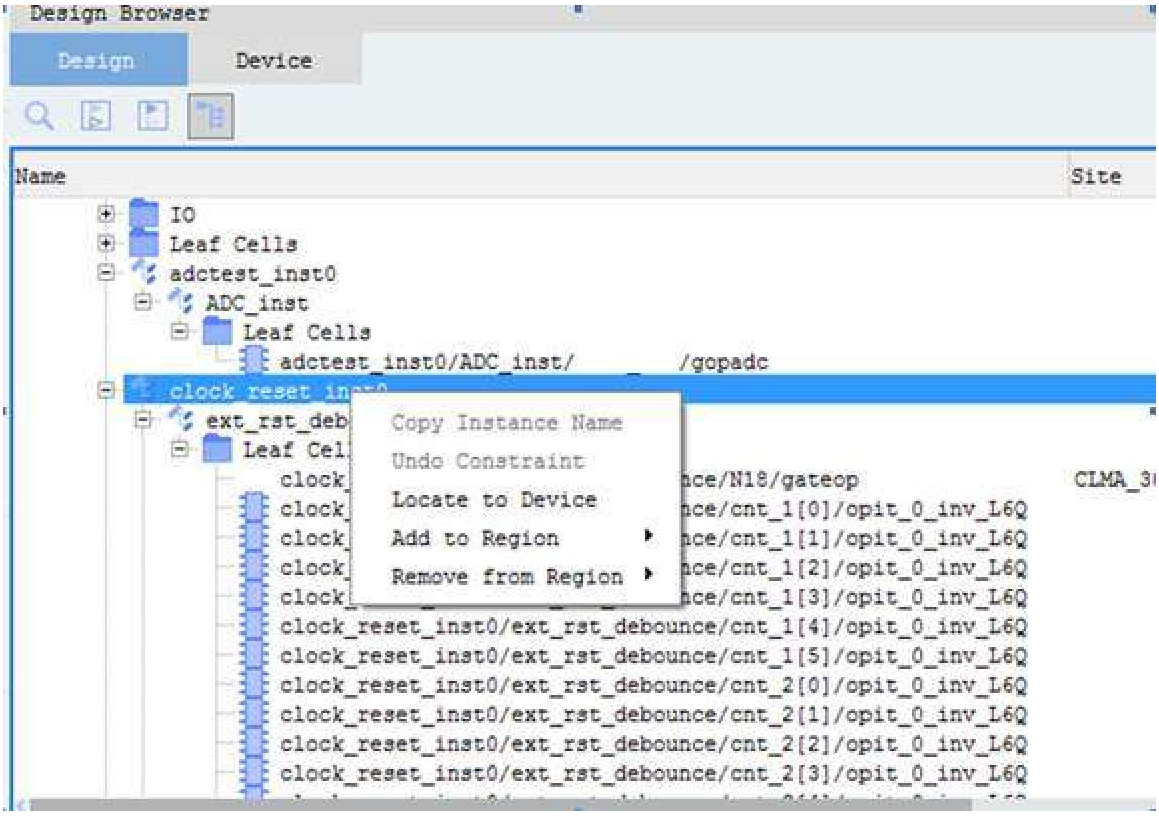


Figure 3-8 Locate to device

Below the Design Browser is the thumbnail of the device, and the following two figures represent the thumbnails of the floorplan view and package view respectively. When the user is zooming in, he can observe the global constraints in the thumbnail, and drag the box in the thumbnail with the mouse to move the viewing angle, and click anywhere in the thumbnail to quickly locate the range.

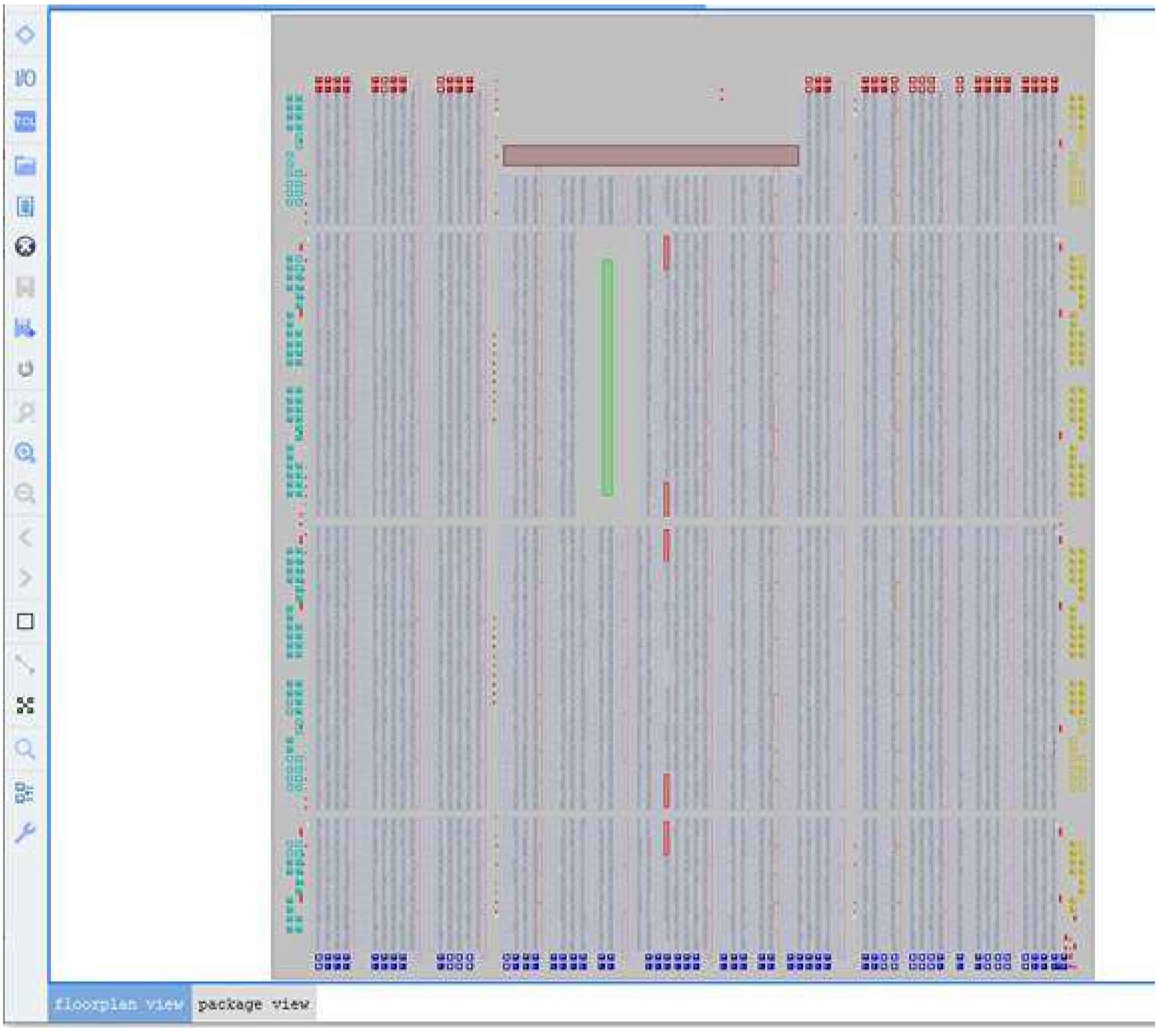


Figure 3-9 Floorplan view thumbnails

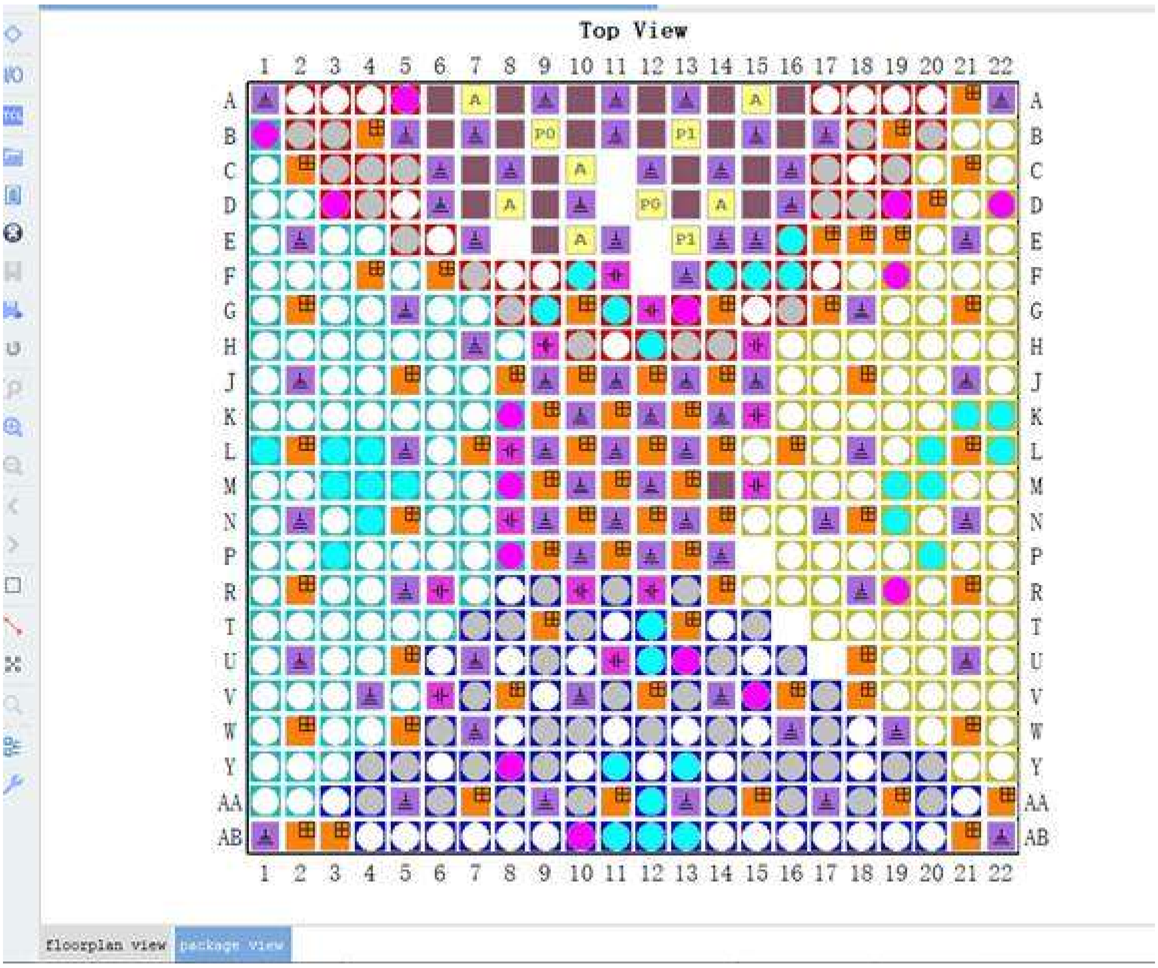


Figure 3-10 package view thumbnails

Thumbnails can also display related information about constraints. After constraining in floorplan view or package view, you can view corresponding constraint information in the thumbnail, including area constraints and non-area constraints.

3.2 Floorplan View

This window displays the resource location of the chip, surrounded by IO resources and logical resources in the middle. You can drag the instance to the matching device in the current window, and the constrained position will be highlighted. After unconstraint, the default state is restored. The window can also display the scope of the area constraints, and the instances placed in the area will be laid out in the area during automatic layout.

Click the button below the " view " window to switch windows, as shown in the figure.



Figure 3-11 Switch tabs under the view window

Click the " floorplan view " tab to enter the corresponding window, as shown in the figure.

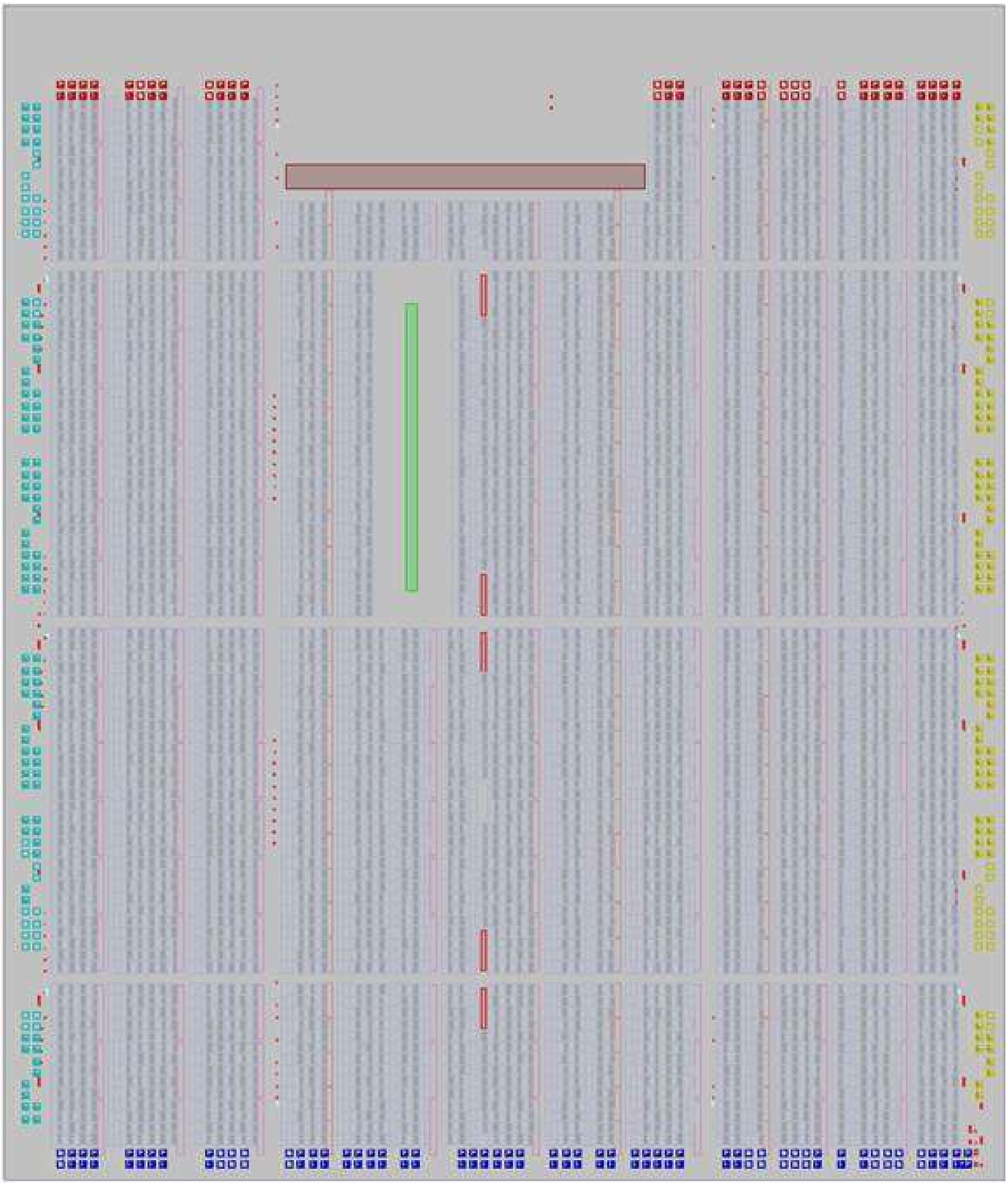


Figure 3-12 Floorplan view windows

3.3 Package View

IO instances can be bound to this window. The constrained position will be highlighted, and the unconstrained will restore the default state.

" package view ", switch to the figure below, which shows the constrained IO location.

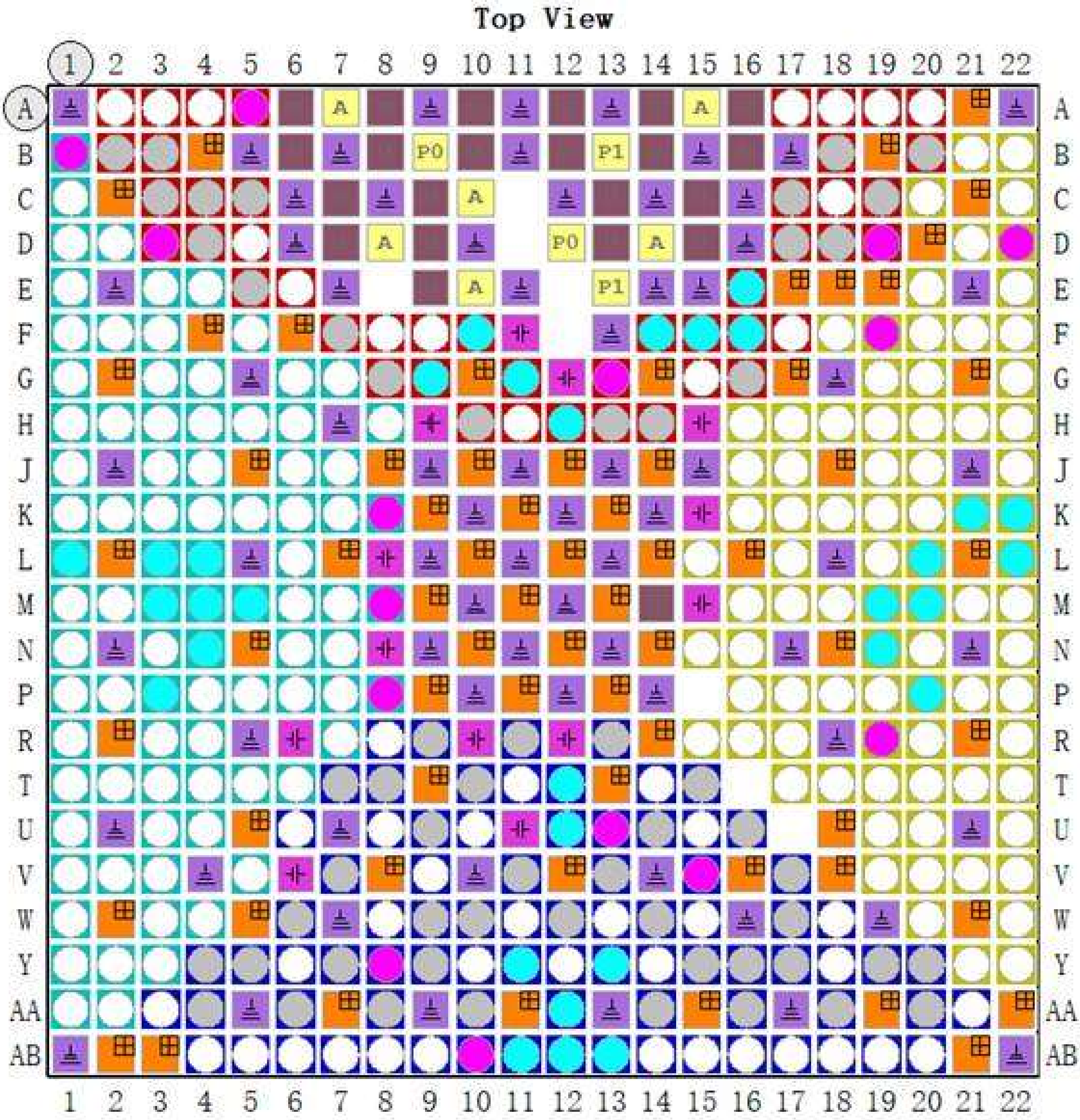


Figure 3-13 Package View window

Right-click the blank space of the window to select "Package Top View" or "Package Bottom View", as shown in the figure below.

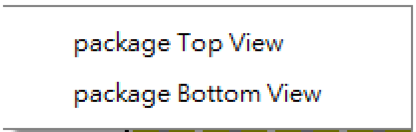


Figure 3-14 The right-click menu of the package view window

3.4 I/O Table

This window can set the I/O, and its constraint effect is also fed back to the package view and Design Browser in real time. IO Table can sort the columns by clicking the header of the corresponding column, move the position of the column by moving the header of the column, or restore the default order by right-clicking the reset order on the header, which is convenient for operation. When editing IO constraints, if you need to copy the corresponding attribute values to other ports for the existing

constraints, you can flexibly use the right-click copy and paste. Copy can copy multiple attribute values of a single-line port, and then paste them to other ports. The IO Table is shown in the figure below.



Figure 3-15 I/O Table interface

The options that can be set include:

I/O NAME : Displays the I/O name.

I/O DIRECTION : Display I/O types, including input, output, and inout.

LOC : The pin of the constraint.

BANK : The bank where the pin is located.

VCCIO : IO input and output voltage.

IOSTANDARD : IO standard.

DISABLE_DRIVE column: DRIVE enable (supported only by TITAN series, this column is used to enable DRIVE, if it is checked, it means that PMOS/NMOS can be set, if it is not checked, it means that DRIVE can be set, the interface defaults to unchecked state, this parameter is not will be written in the constraints file).

DRIVE : drive current.

PMOS_FINGER : PMOS driving capability of single-ended driver (only supported by TITAN series).

NMOS_FINGER : NMOS driving capability of single-ended driver (only supported by TITAN series).

BUS_KEEPER : Set pull-up and pull-down resistors.

SLEW : Slew rate.

HYS_DRIVE_MODE : Enter hysteresis mode.

VREF_MODE : reference voltage VREF mode.

VREF_MODE_VALUE : Internally generated VREF and dedicated VREF input pin mode setting.

DDR_TERM_MODE : DDR memory application input matching resistance setting.

DIFF_IN_TERM_MODE : Input termination resistor setting for differential input.

OPEN_DRAIN : Drive mode selection.

IN_DELAY : Input delay.

OUT_DELAY : output delay.

CP_IPT : Correct the default value of poly current.

CAL_MODE : DDR mode input built-in termination resistance calibration function control.

DDR_RES : Use the built-in resistor value when the calibration function is enabled.

CLAMP : The function is used to clamp the input voltage at VCCIO + VT when the IO input voltage is higher than the power supply VCCIO

3.5 Region

Area constraints refer to delineate a certain area, drag the instance into this area, and the subsequent layout will ensure that the instance is placed in this area. The Region window is shown in the figure below.

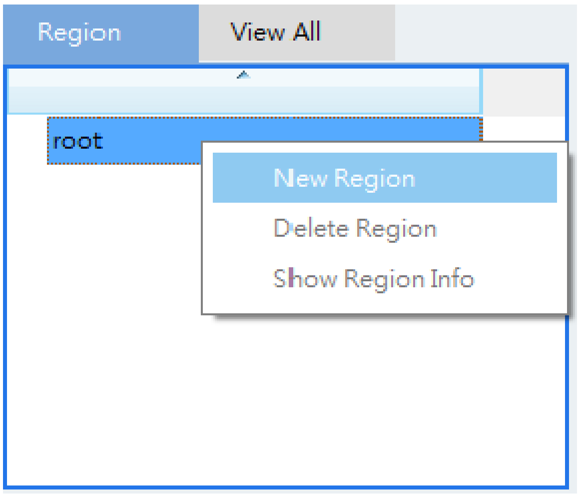


Figure 3-16 area window

3.6 Window association

There is a one-to-one correspondence between the IO in the floorplan view, the IO in the package view, and the IO constraints in the I/O Table. When the constraint position of an IO instance in one of the windows changes, the other windows will change at the same time to maintain consistency.

4. DETAILED OPERATION

4.1 Search instance

Searching in the search box supports two fuzzy matching characters, "*" (matches 0 or more characters) and "?" (matches only one character), and they are not case-sensitive.

Example 1.1 : Enter I*F as the search condition, and the search result is shown in the figure below.

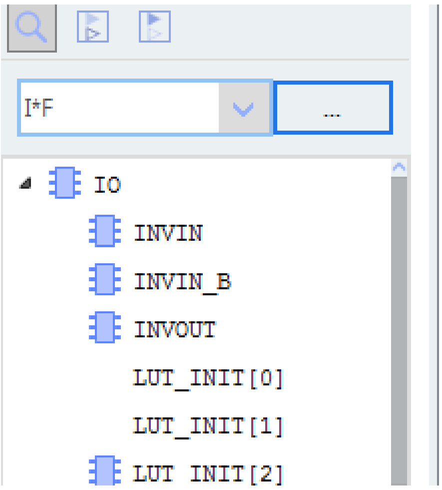


Figure 4-1 Use " * " to search for instances

Example 1.2 : After entering the search conditions, click the Hide Constraint button to hide the constrained instances that meet the search conditions, as shown in the figure:

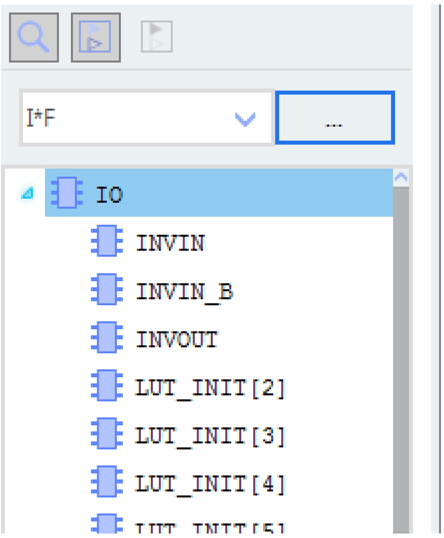


Figure 4-2 Click Hide Constraint button, search instance

Example 1.3 : After entering the search conditions, click the Hide UnConstraint button to hide the unconstrained instances that meet the search conditions, as shown in the figure:

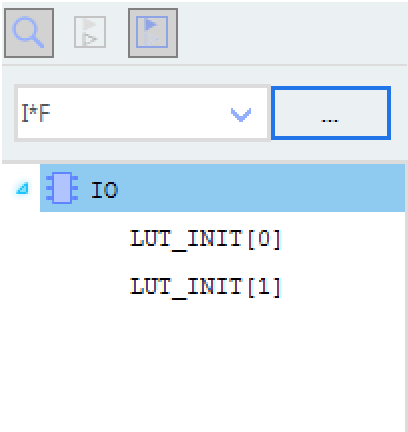


Figure 4-3 Click Hide UnConstraint button, search instance

Example 2.1 : Enter I?F as the search condition, and the matching results become less, as shown in the figure below.

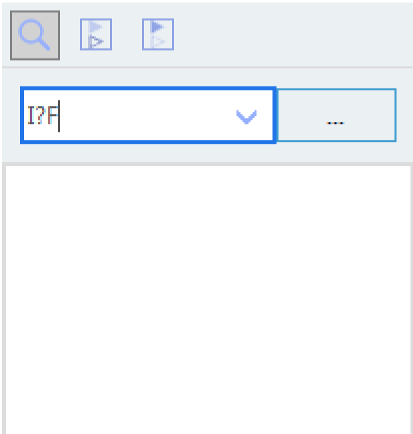


Figure 4-4 Use a " ? " to search for instances

Example 3 : Enter I??F as the search condition, as shown in the figure below.

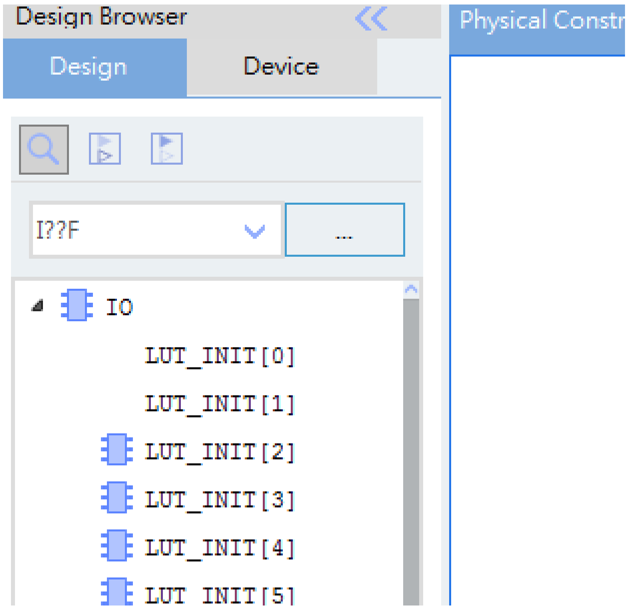


Figure 4-5 Use multiple " ? " search instances

4.2 Constraint instance

Click an instance name in the Design Browser, such as T_GTP_INV / opit_0, hold down the left mouse button, and drag it to a position on the floorplan view. If the constraint is successful, the resource at this position will be highlighted, and the icon in front of the instance name will disappear, as shown in the figure below.

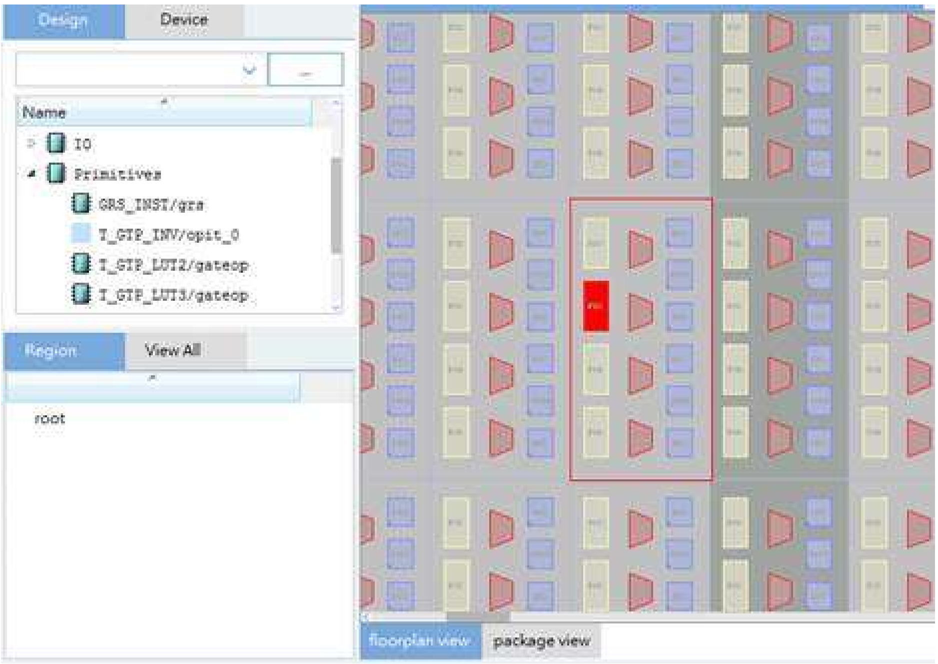


Figure 4-6 Constraint instance

4.3 View constrained instances

If you want to view the placement position of the constrained instance, you can click the name of the instance in the Design Browser, and then you can see that the instance will be highlighted in the floorplan ciew on the right, as shown in the figure below.

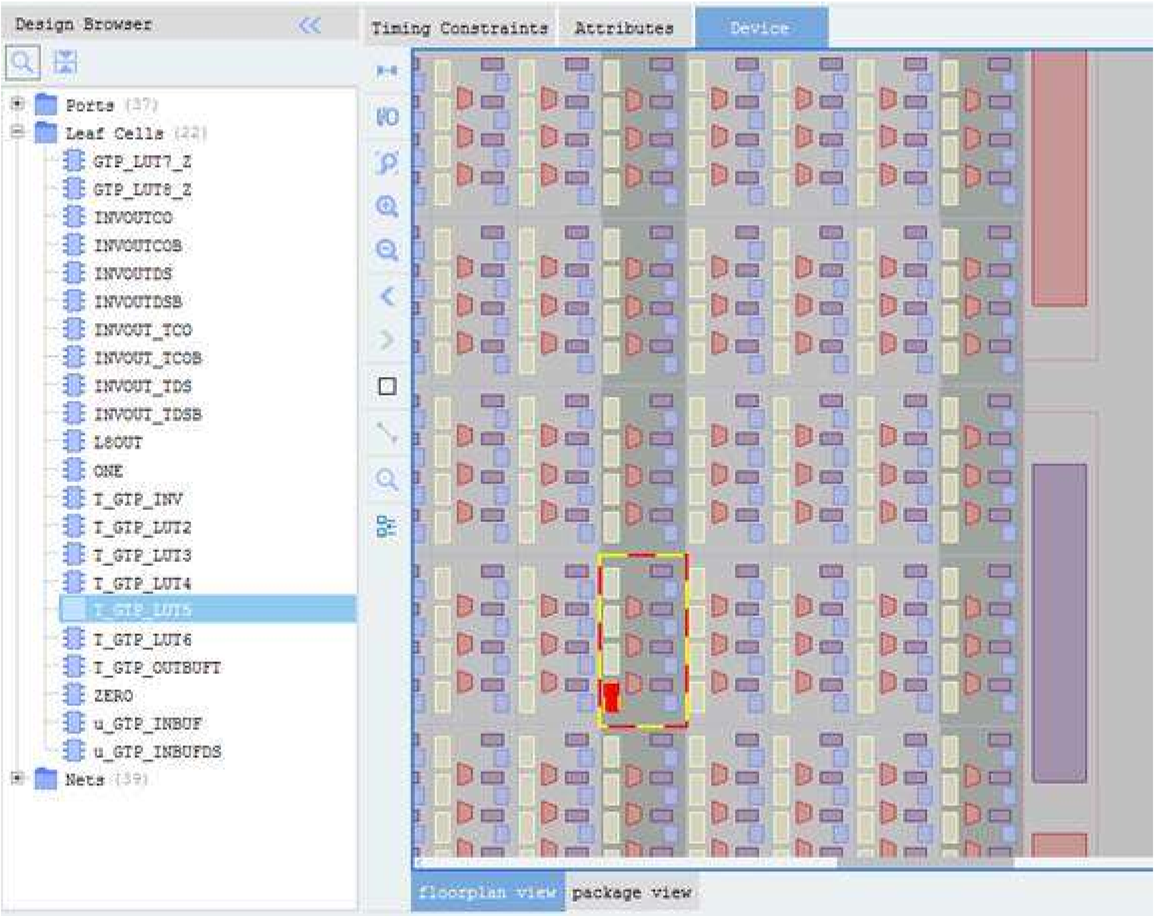


Figure 4-7 View constrained instances

Floorplan view supports users to set a custom device highlight color, and the right-click new menu options are set as follows:

1. Highlight Selection (highlight when a device is selected, set the color to set one or more selected devices)

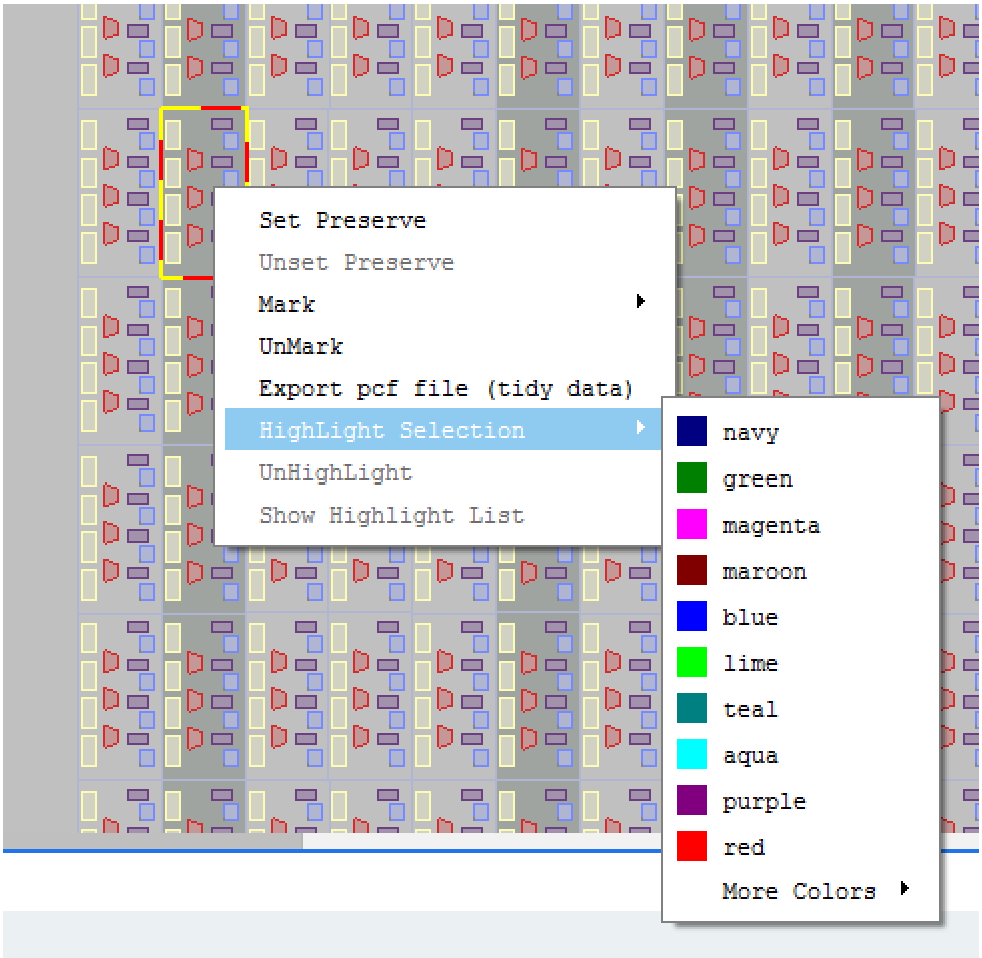


Figure 4-8 High Light Selection

2. UnHighLight (When there are highlighted devices, you can cancel the highlight color of one or more highlighted devices)

3. Show Highlight List (this option is highlighted when there is a highlight configuration interface and there is a device with highlight settings on the interface)



Figure 4-9 Show Highlight List

4.4 IO constraints

4.4.1 Constrain IO in the floorplan view/package view window

Click the name of an IO in the Design Browser, such as LUT_INIT【4】, hold down the left mouse button, and drag it to a pin in the floorplan view or package view. If the constraint is successful, the resource at this location will be highlighted, and the icon in front of the instance name disappear, as shown in the following two figures.

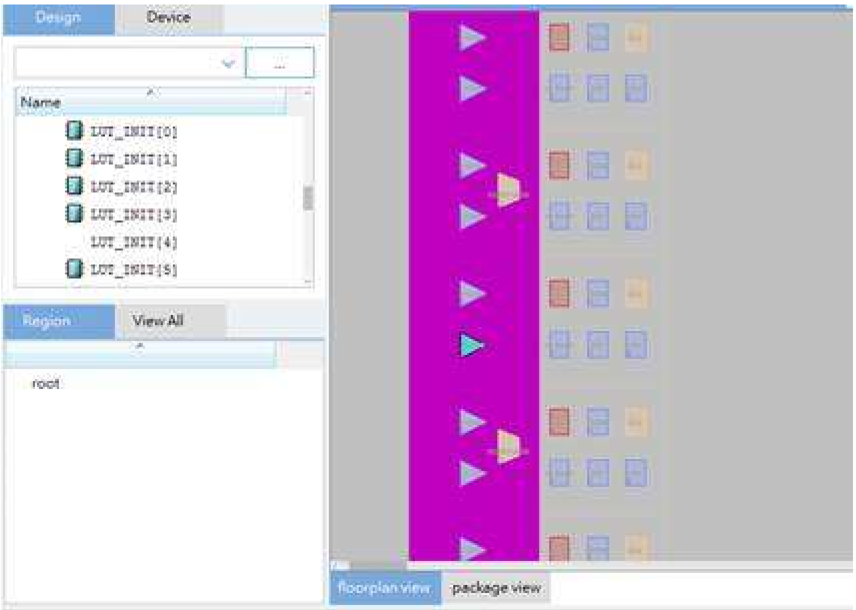


Figure 4-10 Drag and drop the IO to the IO Device in the floorplan view

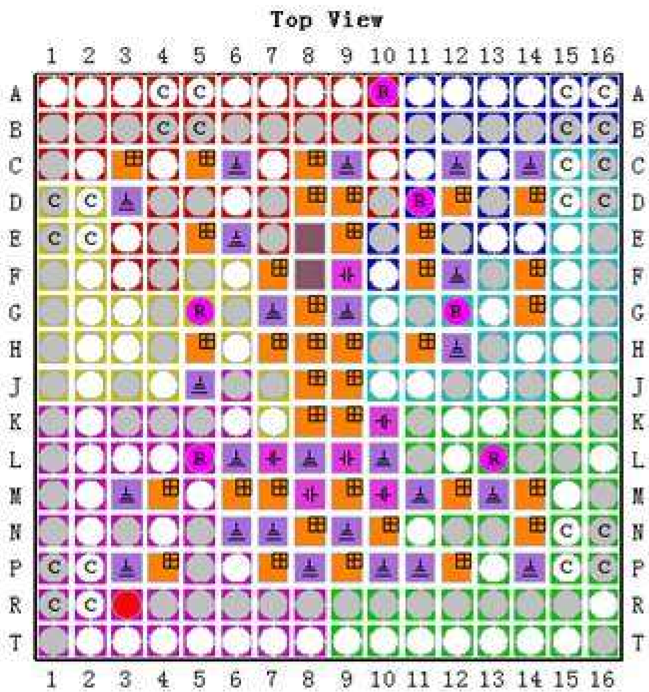


Figure 4-11 Drag and drop the IO into the pin of the package view

4.4.2 Constrain IO in I/O Table

(1) Instructions for performing IO constraints in the IO Table

Open the I/O Table window by clicking the I/O Table button on the toolbar, as shown in Figure 4-8. Click the blank space of Loc in any column, you can manually enter the legal pin or select the pin to be constrained from the drop-down list, the Bank column will automatically display the bank to which the pin belongs, and click the drop-down list displayed in other columns to select the required The value of the setting.

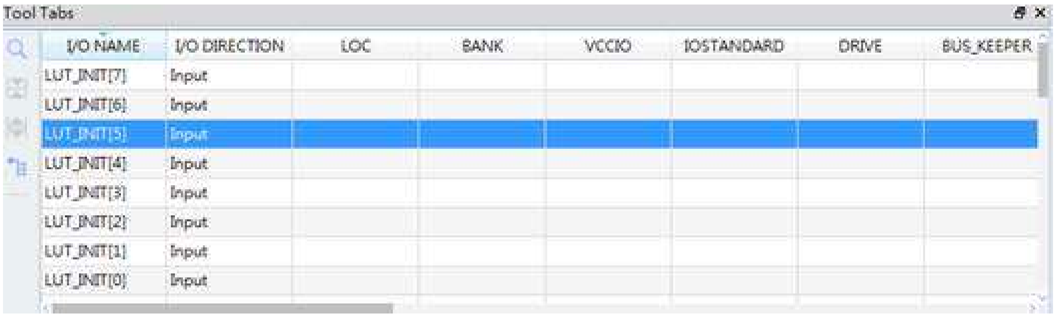


Figure 4-12 I/O Table window

Once the Loc in the IO Table is determined, the Bank will also be determined. Other columns need to give the default VCCIO voltage value and the default IOSTANDARD standard value by themselves. If all columns in the IO Table can be edited, a drop-down box will appear after clicking.

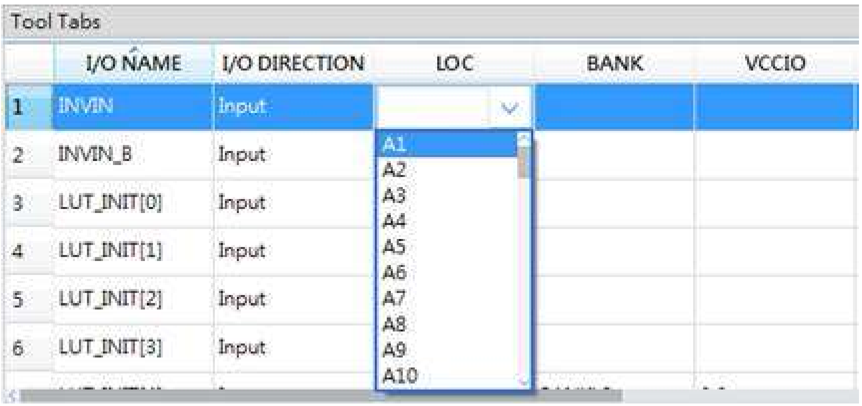
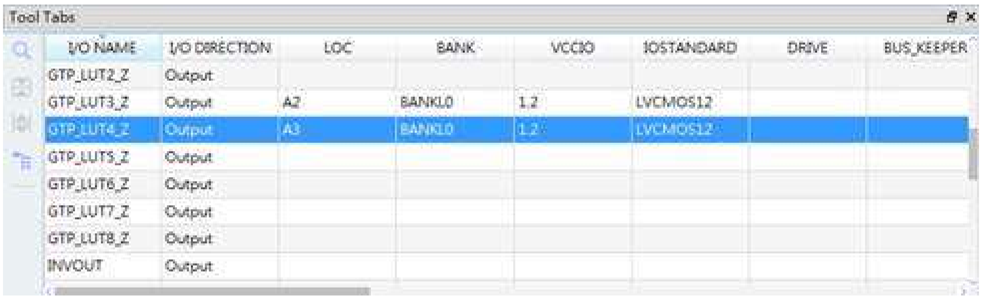


Figure 4-13 Example of Loc setting

Among them, it should be noted that if a Loc position is already occupied by a port, other ports can no longer choose this Loc position. The location information entered in Loc is not case-sensitive, but if the input is wrong, the previous correct Loc value will be returned.

(2) Relevant description of IO constraints

The VCCIO voltage values in the same Bank are consistent, if any one of the voltage values is changed, the rest will also change accordingly. An example is shown in Figure 4-10.



Tool Tabs

I/O NAME	I/O DIRECTION	LOC	BANK	VCCIO	IOSTANDARD	DRIVE	BUS_KEEPER
GTP_LUT2_Z	Output						
GTP_LUT3_Z	Output	A2	BANKL0	1.2	LVCMOS12		
GTP_LUT4_Z	Output	A3	BANKL0	1.2	LVCMOS12		
GTP_LUT5_Z	Output						
GTP_LUT6_Z	Output						
GTP_LUT7_Z	Output						
GTP_LUT8_Z	Output						
INVOUT	Output						

Figure 4-14 The same VCCIO value in the same Bank

Input type ports can be set to IN_DELAY, and Output type ports can be set to OUT_DELAY, as shown in the figure below.

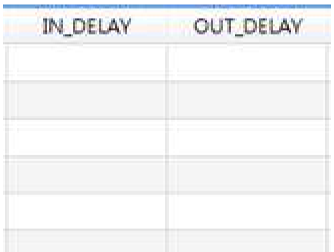
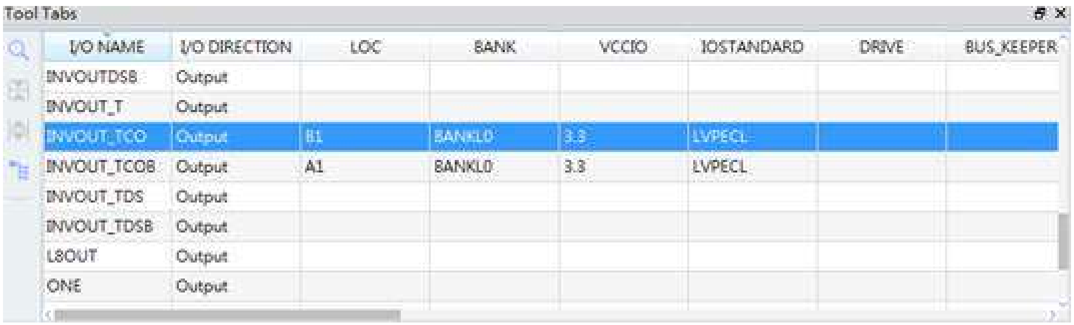


Figure 4-15 Input containing IODELAY

Among them, the valid input values of IN_DELAY or OUT_DELAY are all positive integers, and the specific value depends on the device used. Different device types have different input ranges.

For differential IO (Diff IO), because they appear in pairs, when setting the value, if one of them is set, the other will also be set together, and except for the difference in Loc, the values of other items are the same. as the Figure shows:



Tool Tabs

I/O NAME	I/O DIRECTION	LOC	BANK	VCCIO	IOSTANDARD	DRIVE	BUS_KEEPER
INVOUTDSB	Output						
INVOUT_T	Output						
INVOUT_TCO	Output	B1	BANKL0	3.3	LVPECL		
INVOUT_TCOB	Output	A1	BANKL0	3.3	LVPECL		
INVOUT_TDS	Output						
INVOUT_TDSB	Output						
L8OUT	Output						
ONE	Output						

Figure 4-16 Differential IO constraints

Among them, INVOUTCO and INVOUTCOB are a pair of differential IO pairs.

(3) Correspondence between PAP_IO_DRIVE, PAP_IO_PMOS_FINGER and PAP_IO_NMOS_FINGER of PGT180H

PGT180H can choose to set PAP_IO_DRIVE, or you can choose to set PAP_IO_PMOS_FINGER and PAP_IO_NMOS_FINGER. The corresponding relationship between them is as follows:

Corresponding relation of the number of P tube /N tube fingers of the IOB driver of PGT180H

Finger	The current corresponding to the number of P tube /N tube fingers of the IOB driver of PGT180H (mA)				
	Vccio =3.3V	Vccio =2.5V	Vccio =1.8V	Vccio =1.5V	Vccio =1.2V
1	9	7.5	5.2	3.8	2.2
2	18	15	10.4	7.6	4.4
3	27	22.5	15.6	11.4	6.6
4	36	30	20.8	15.2	8.8
5	45	37.5	26	19	11.2
6	54	45	31.2	22.8	13.2

Example:

1) The test condition is ttcorner.

2) The Finger column in the table indicates the value set by PAP_IO_PMOS_FINGER and PAP_IO_NMOS_FINGER.

4.5 Regional constraints

4.5.1 Create a new region and region constraints through the Region window

Open the Region window, and open the right-click menu in the blank space, as shown in the figure, the right-click menu includes New Region, Edit Region, Delete Region and Show Region Info options.

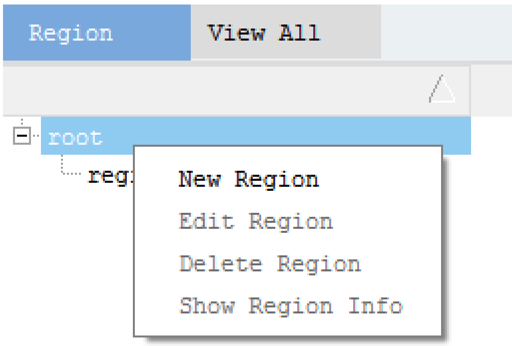


Figure 4-17 New Region

After selecting the region and right-clicking to delete, a prompt box will pop up to let the user confirm whether to continue the operation. Click YES to delete, and click NO to cancel the delete operation.

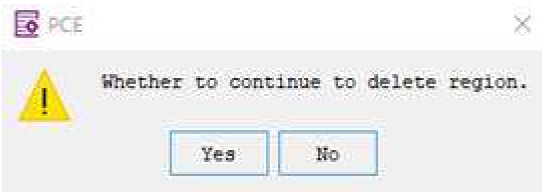


Figure 4-18 delete region

(1) Click the New Region option, and a new region edit box will appear, as shown in the figure below.

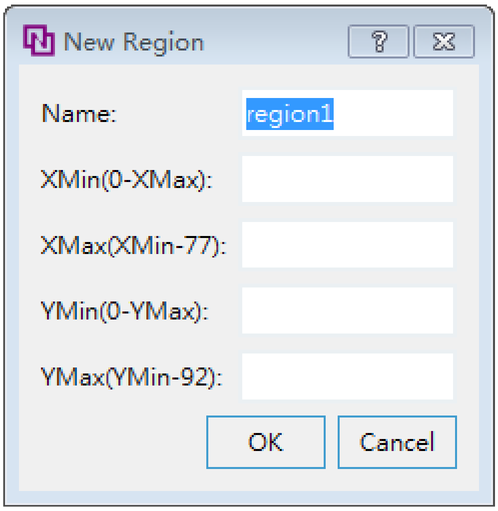


Figure 4-19 Constrained area edit box

The New Region edit box includes:

【 Name 】: The name of the region, which can be modified.

【 XMin (xx- XMax) 】: Abscissa coordinate of the left border of the area.

【 XMax (XMin -xx) 】: The abscissa of the right border of the area.

【 YMin (yy-YMax) 】: The ordinate of the lower border of the area.

【 YMax (YMin-yy) 】: The ordinate of the upper border of the area.

(2) Enter the relevant value of the area range, click OK, as shown in the figure below.

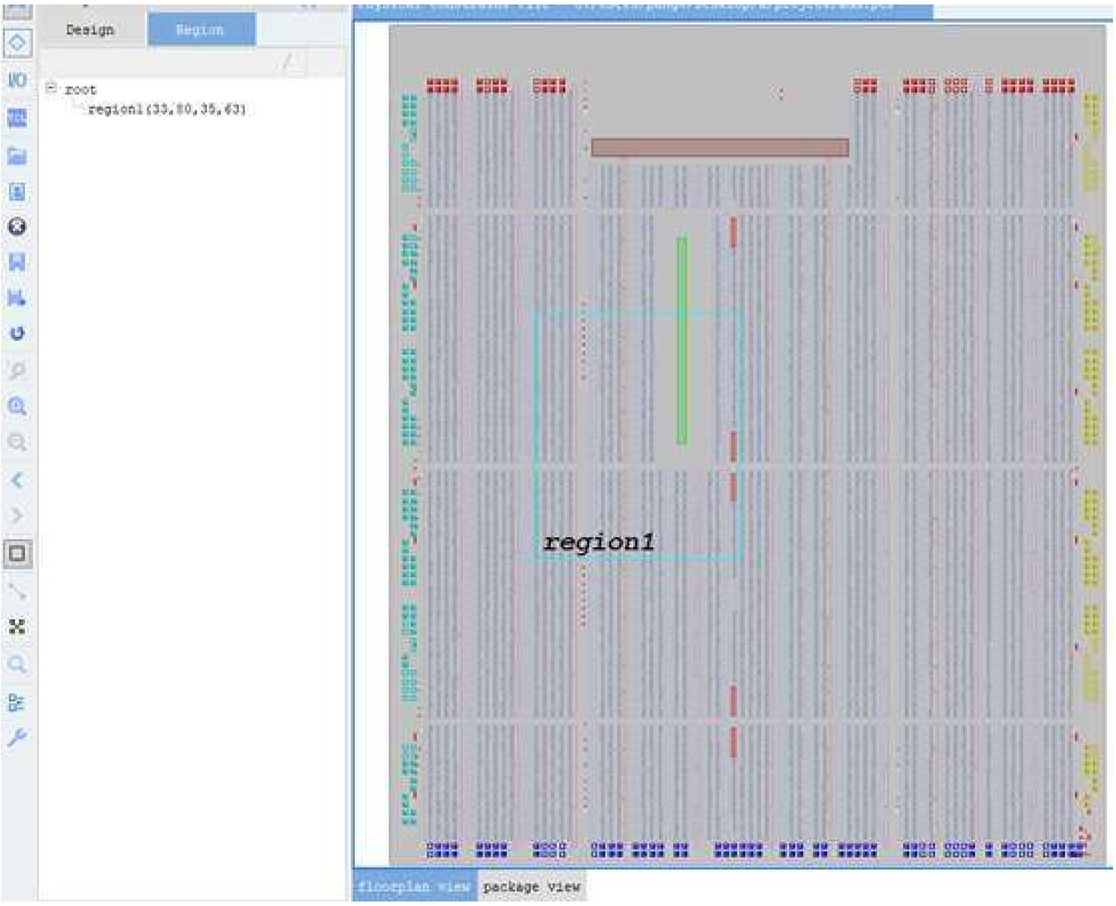


Figure 4-20 geographic range

(3) First click the Region Mode button on the toolbar to enter the region mode, then drag and drop an instance from the Design Browser to the region1 area, and the constraint is successful, as shown in the figure below.

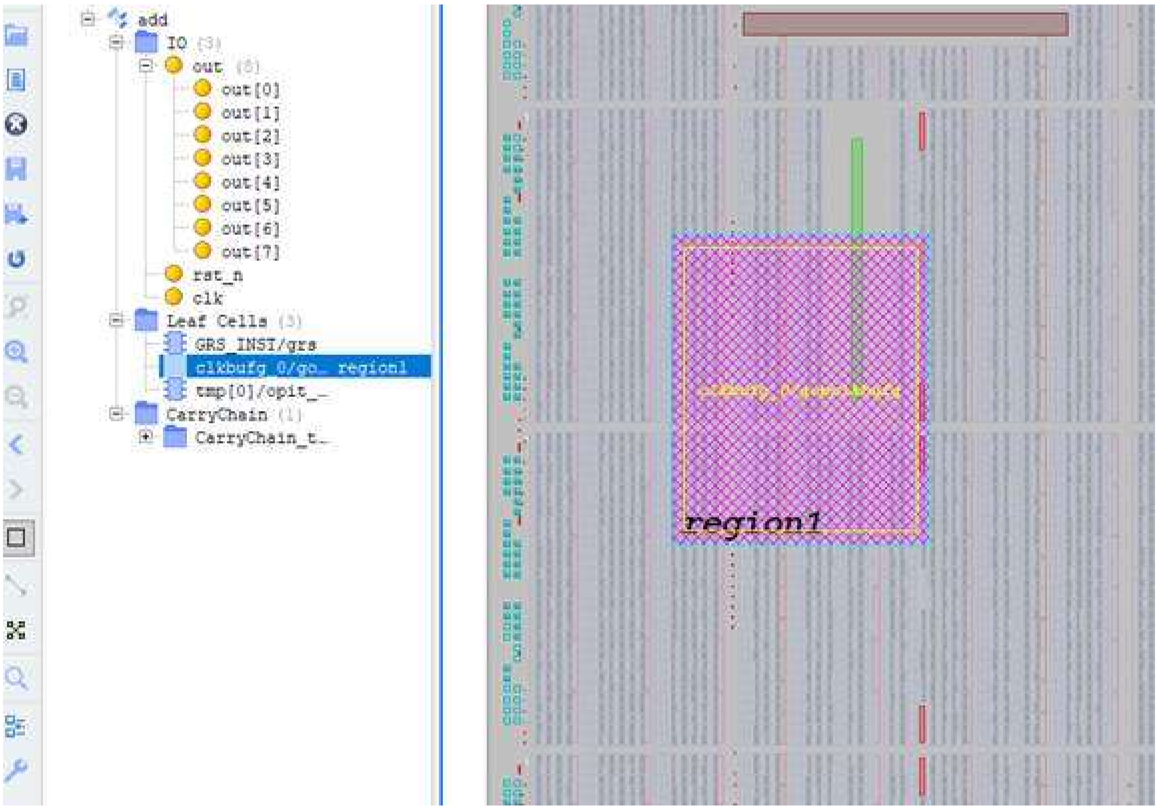


Figure 4-21 region1 area

If there is an overlapping area, when dragging the inst, a pop-up box will prompt the user to select the drop area;



Figure 4-22 drag inst

4.5.1 Create a new region after entering the Region mode

(1) Click the Region Mode button on the toolbar to enter the Region mode, as shown in the figure.

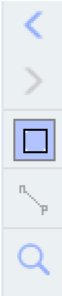


Figure 4-23 Click the Region Mode button to enter the Region mode

(2) Right-click in the floorplan view to see the draw region command, and then you can directly use the mouse to select the region in PCE to specify the constraint region, as shown in the figure below.

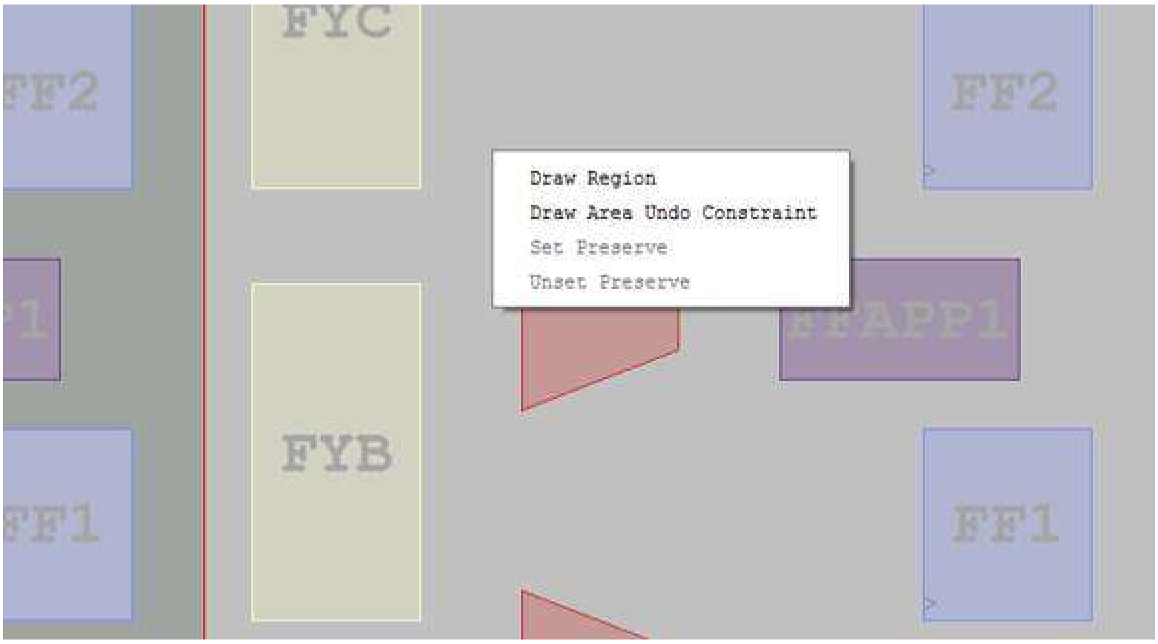


Figure 4-24 Specify the restricted area

After the mouse selects the area, a naming prompt box will appear, as shown in the figure below.

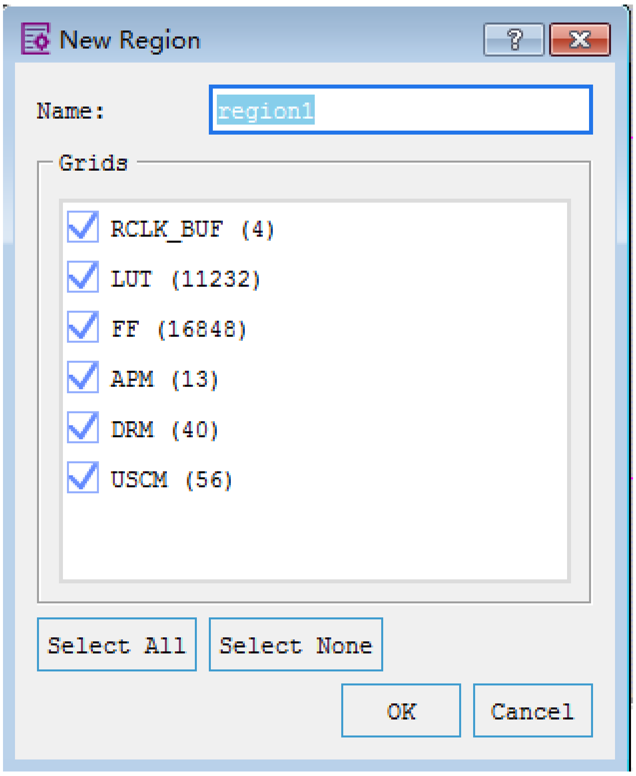


Figure 4-25 Region naming tooltip

(3) Select Draw Area Undo Constraint, and the Undo Constraint View bullet box will appear after the mouse selects the area. This interface supports batch unconstraint inst and IO.

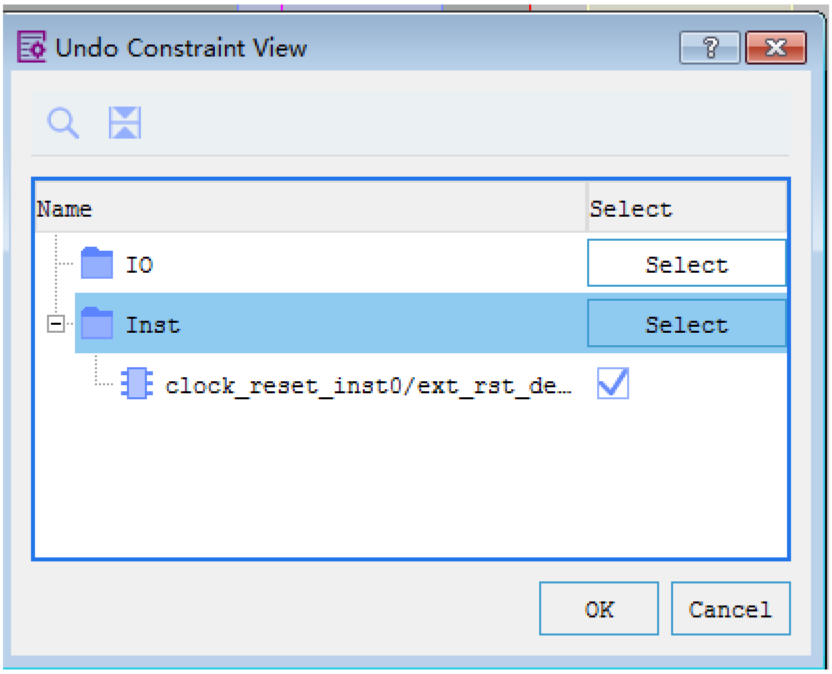
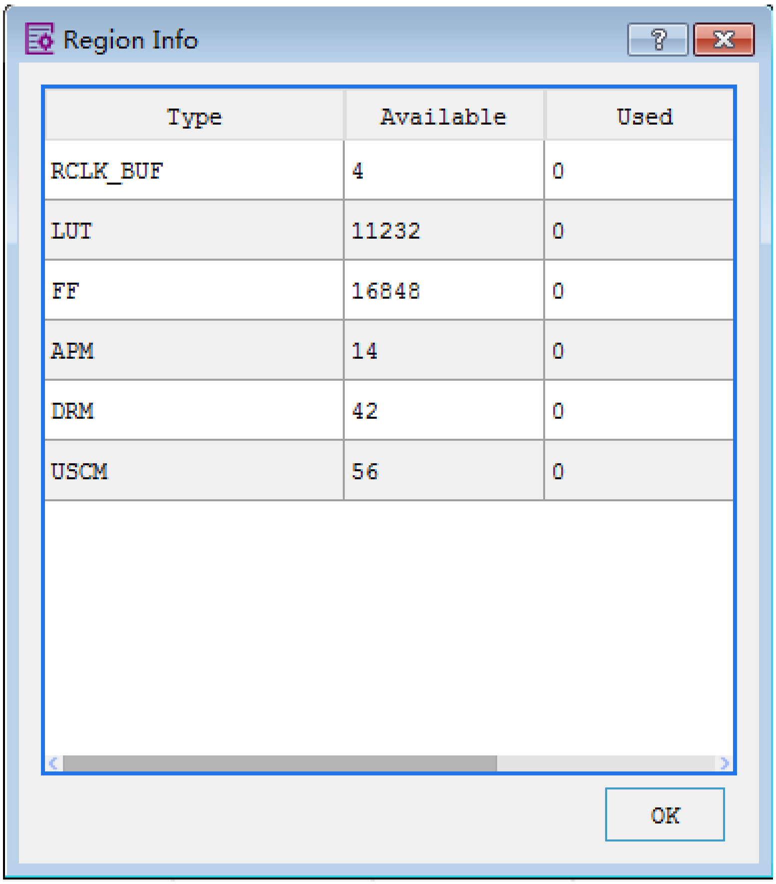


Figure 4-26 Draw Area Undo Constraint

4.5.3 View area information

Select a region and click Show Region Info in the right-click menu to view the device information contained in the region and the device information used in the region, as shown in the figure below.



Type	Available	Used
RCLK_BUF	4	0
LUT	11232	0
FF	16848	0
APM	14	0
DRM	42	0
USCM	56	0

Figure 4-27 Region Info

4.6 preserve constraints

4.6.1 Single Device setting preserve

In the Floorplan interface, select a single Device, and select the function set preserve in the right-click menu to set the preserve property.

The device after setting preserve is shown in the figure below:

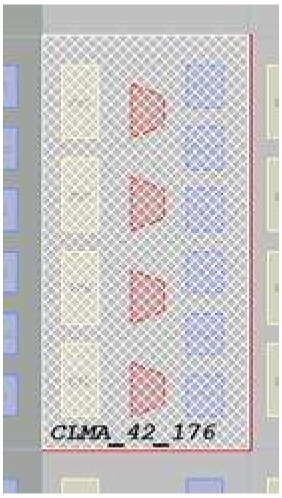


Figure 4-28 set preserve

For a single device with preserve set, you can also right-click and select the function unset preserve to cancel the set preserve attribute.

4.6.2 Multiple Device settings preserve

On the Floorplan interface, select a region and right-click set preserve to set the preserve attribute for the region, that is, all devices in the region have the preserve attribute set.

The region with preserve is set as shown in the figure below:

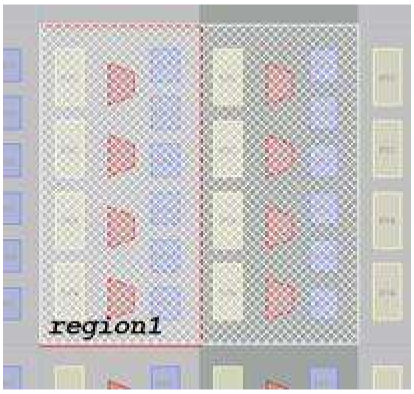


Figure 4-29 set area preserve

For the region setting preserve, you can also select the region, then right-click and select the function unset preserve to cancel the set preserve attribute.

4.7 cancel constraints

4.7.1 Unconstraint in Design Browser

Select the constrained instance in the Design Browser window, open the right-click menu, and

select " Undo constraint ", as shown in the figure below, you can cancel the constraint.

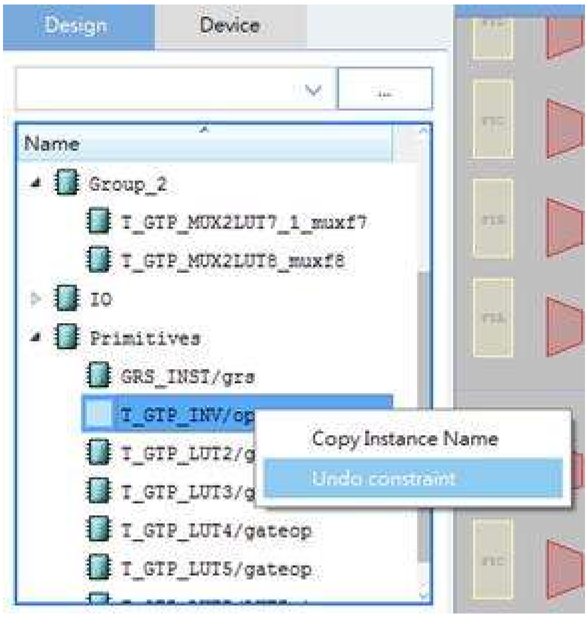


Figure 4-30 cancel constraints

4.7.2 Cancel constraints in floorplan view/package view

Select the constrained resource on the floorplan view or package view, drag it back to the Design Browser window or click the Undo constraint option in the right-click menu in the floorplan view and package view to cancel the constraint.

4.8 Change constraint position

4.8.1 Changing the position of a single constrained instance

Select the constrained resources on the floorplan view or package view, and drag and drop them to other constrained positions.

4.8.2 Changing the position of multiple constrained instances

Hold down the Ctrl key, select multiple constrained instances, and drag them to other constrained positions, as shown in the figure below. If an instance has been selected, hold down the Ctrl key and click the instance to deselect it.

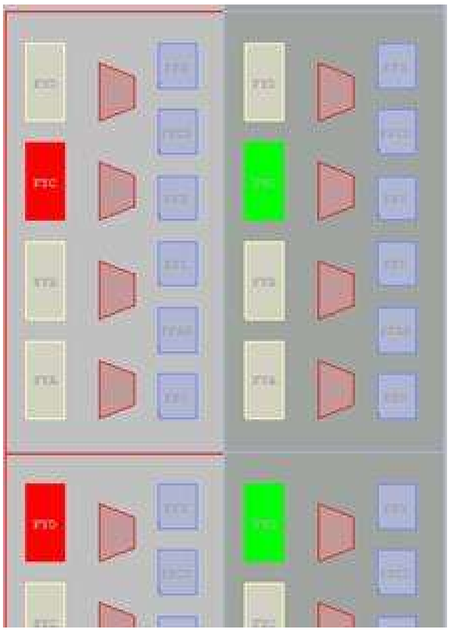


Figure 4-31 select multiple instances

4.9 Reload Design DB/PCF

When the Design DB loaded into PCE or the PCF file is changed externally, the PCE interface will prompt whether to reload, as shown in the figure below.

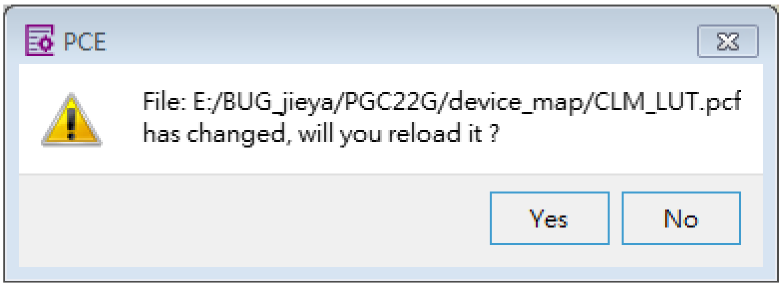


Figure 4-32 reload prompt

Click the " Yes " button to reload the modified file (Design DB or PCF) into PCE and replace the original file, select the " No " button to not reload the modified file to PCE.

If the changed Design DB file, when the Design DB file fails to be reloaded, it will prompt that the Design DB load failed, as shown in the figure below. After clicking the " OK " button, PCE will exit.

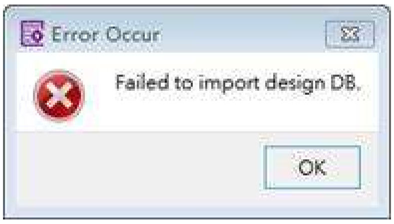


Figure 4-33 Reload failure prompt

4.10 Mark function

In the floorplan view, the instance and device resources are supported to be marked, and there will be a "diamond" mark after the mark. At the same time, the mark information will be synchronized in the mark browser and differentiated by color. In the mark browser, you can locate a resource with a mark, and you can remove the resources that don't need a mark from the mark browser. (Mark operation on inst and port is also supported in design browser, and mark operation on port is also supported in IO table and IO tree)

The specific operation is as follows:

1. For the selected resource, right click and select Mark/Unmark

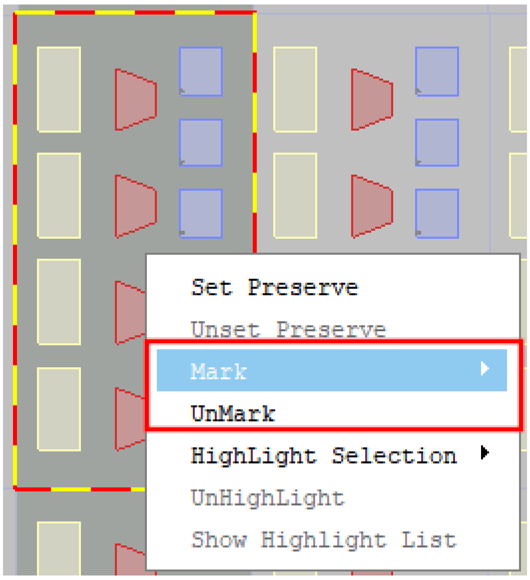


Figure 4-34 marks

2. Mark resource effects are as follows

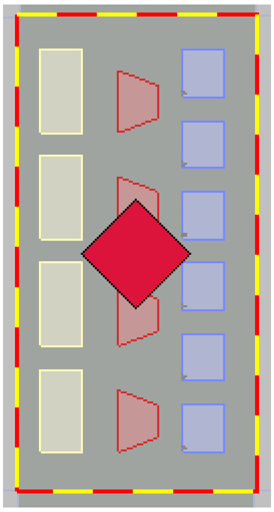


Figure 4-35 mark pattern

3. There is a diamond button on the toolbar to control whether to display the Mark browser window



Figure 4-36 mark buttons

4. Display Mark browser as follows

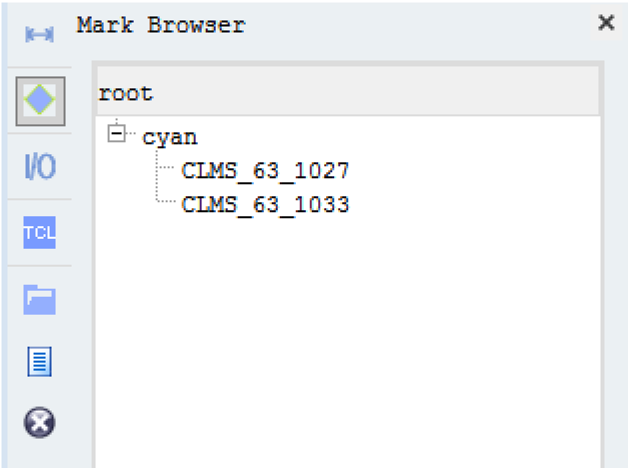


Figure 4-37 mark browser

5. With the same operation, you can remove unnecessary resources in the Mark browser. The specific method is to select the resource right-click menu and select the Unmark function, or click Unmark all to clear all mark marks.

6. Add the " unordered mode " function in Mark browser, as shown in the figure below. This feature is turned off by default. When using the marking function, when the number of markings is too large (more than 10,000 resources), it may be slow to render the UI and sort the Mark browser. After clicking the " unordered mode " icon and turning on the " unordered mode " function, the situation will change.

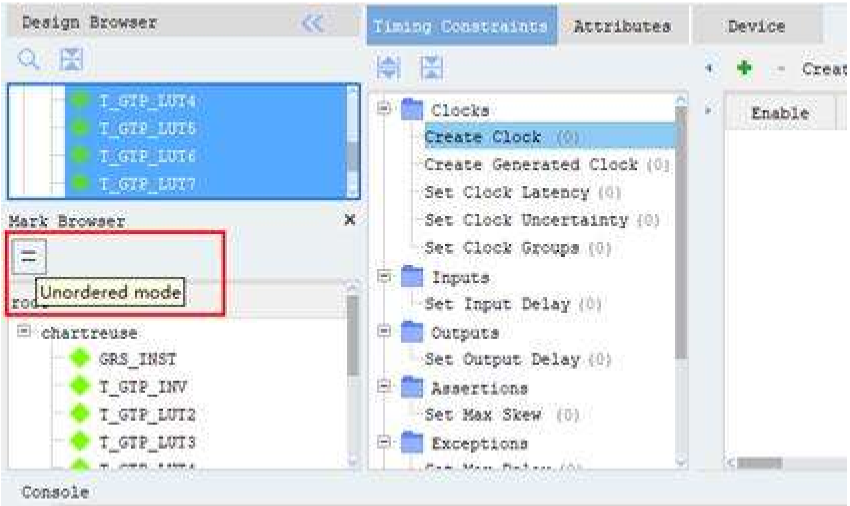


Figure 4-38 unordered mode

Views that support mark operations include design browser, package view, and IO table, and mark has communication functions. That is, select the inst in the design browser to mark, and the mark browser will display the name of the inst, and then apply the LOC constraint to the inst, the same mark exists on the inst in the floorplan interface, and there is a livestock mark in one of them, and the other The inst mark on the relevant communication interface is also cleared. (The same applies to mark communication of IO table, IO tree, package view, and mark browser)

4.11 Export a sequentially ordered PCF file

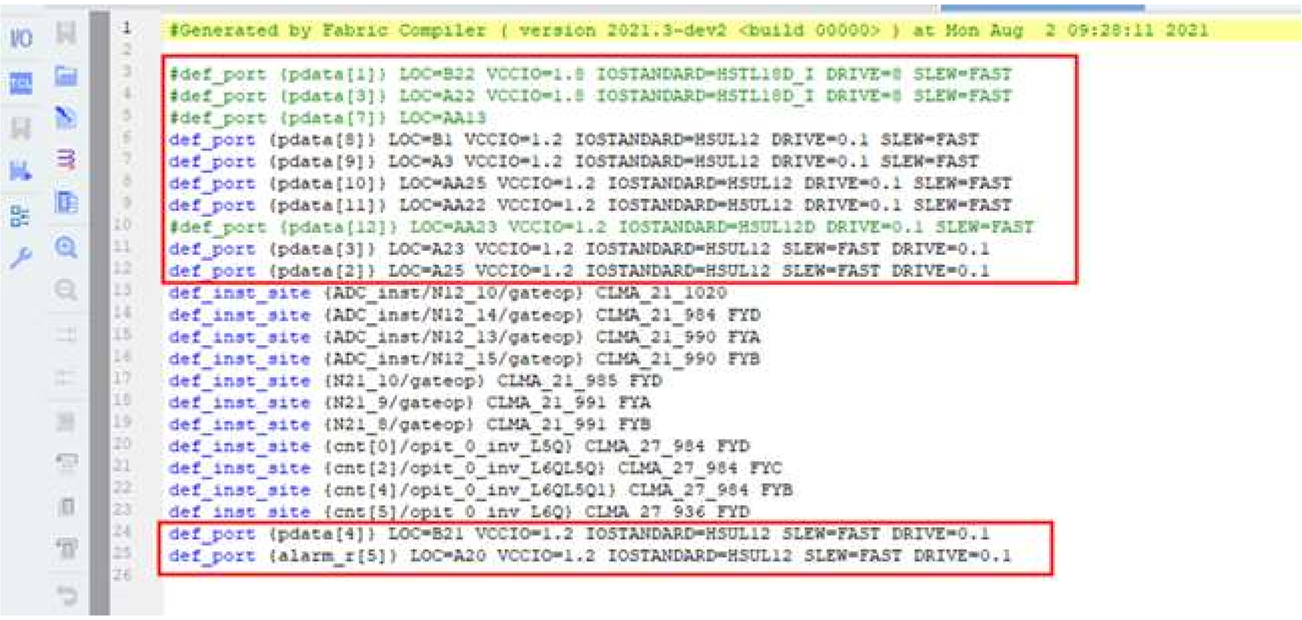
4.11.1 UI operation

On the right-click menu of floorplan, click Export pcf file (tidy data); after clicking, a dialog box will appear, allowing the user to choose the address to save the file, and save the file to the specified location after confirmation.



Figure 4-39 select export sort pcf function

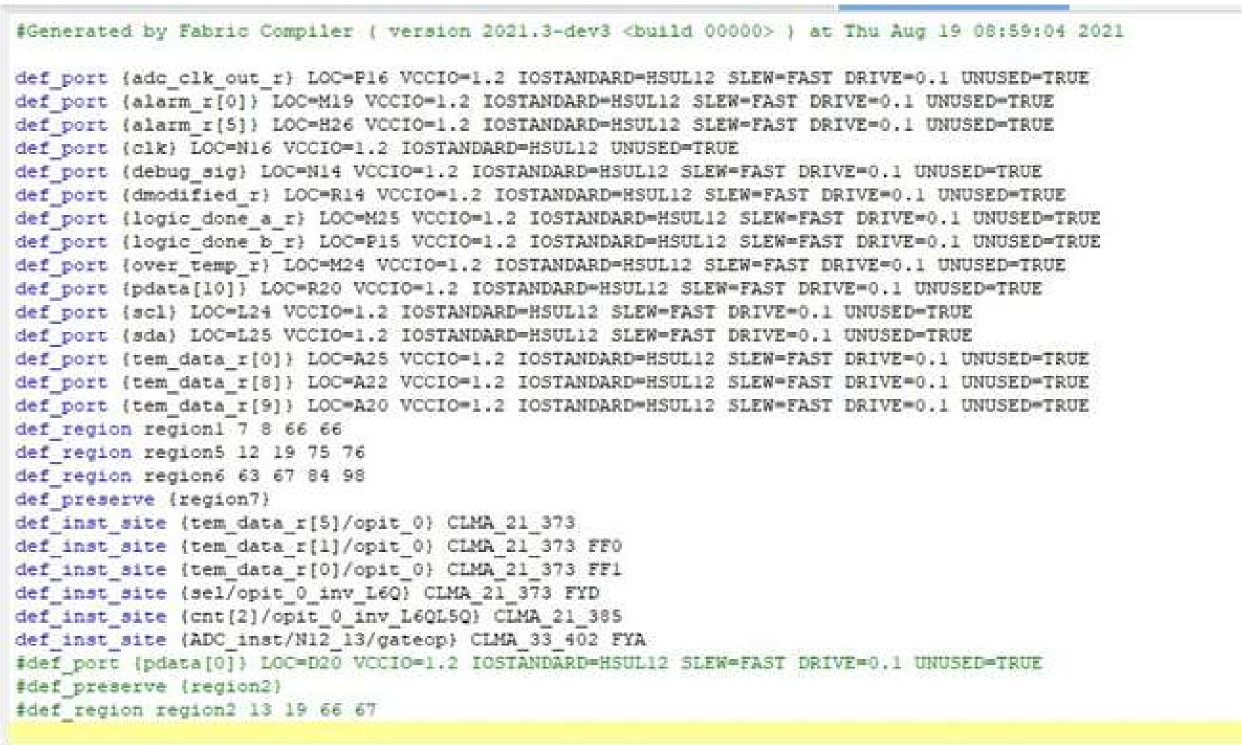
4.11.2 Sorting effect display



```
#Generated by Fabric Compiler ( version 2021.3-dev2 <build 00000> ) at Mon Aug  2 09:28:11 2021

#def_port {pdata[1]} LOC=B22 VCCIO=1.8 IOSTANDARD=HSTL18D_I DRIVE=8 SLEW=FAST
#def_port {pdata[3]} LOC=A22 VCCIO=1.8 IOSTANDARD=HSTL18D_I DRIVE=8 SLEW=FAST
#def_port {pdata[7]} LOC=AA13
def_port {pdata[8]} LOC=B1 VCCIO=1.2 IOSTANDARD=HSUL12 DRIVE=0.1 SLEW=FAST
def_port {pdata[9]} LOC=A3 VCCIO=1.2 IOSTANDARD=HSUL12 DRIVE=0.1 SLEW=FAST
def_port {pdata[10]} LOC=AA25 VCCIO=1.2 IOSTANDARD=HSUL12 DRIVE=0.1 SLEW=FAST
def_port {pdata[11]} LOC=AA22 VCCIO=1.2 IOSTANDARD=HSUL12 DRIVE=0.1 SLEW=FAST
#def_port {pdata[12]} LOC=AA23 VCCIO=1.2 IOSTANDARD=HSUL12D DRIVE=0.1 SLEW=FAST
def_port {pdata[3]} LOC=A23 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1
def_port {pdata[2]} LOC=A25 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1
def_inst_site {ADC_inst/N12_10/gateop} CLMA_21_1020
def_inst_site {ADC_inst/N12_14/gateop} CLMA_21_984 FYD
def_inst_site {ADC_inst/N12_13/gateop} CLMA_21_990 FYA
def_inst_site {ADC_inst/N12_15/gateop} CLMA_21_990 FYB
def_inst_site {N21_10/gateop} CLMA_21_985 FYD
def_inst_site {N21_9/gateop} CLMA_21_991 FYA
def_inst_site {N21_8/gateop} CLMA_21_991 FYB
def_inst_site {cnt[0]/opit_0_inv_L5Q} CLMA_27_984 FYD
def_inst_site {cnt[2]/opit_0_inv_L6QL5Q} CLMA_27_984 FYC
def_inst_site {cnt[4]/opit_0_inv_L6QL5Q1} CLMA_27_984 FYB
def_inst_site {cnt[5]/opit_0_inv_L6Q} CLMA_27_936 FYD
def_port {pdata[4]} LOC=B21 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1
def_port {alarm_r[5]} LOC=A20 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1
```

Figure 4-40 before sorting



```
#Generated by Fabric Compiler ( version 2021.3-dev3 <build 00000> ) at Thu Aug 19 08:59:04 2021

def_port {adc_clk_out_r} LOC=P16 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {alarm_r[0]} LOC=M19 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {alarm_r[5]} LOC=H26 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {clk} LOC=N16 VCCIO=1.2 IOSTANDARD=HSUL12 UNUSED=TRUE
def_port {debug_sig} LOC=N14 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {dmodified_r} LOC=R14 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {logic_done_a_r} LOC=M25 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {logic_done_b_r} LOC=P15 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {over_temp_r} LOC=M24 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {pdata[10]} LOC=R20 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {scl} LOC=L24 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {sda} LOC=L25 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {tem_data_r[0]} LOC=A25 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {tem_data_r[8]} LOC=A22 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_port {tem_data_r[9]} LOC=A20 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
def_region region1 7 8 66 66
def_region region5 12 19 75 76
def_region region6 63 67 84 98
def_preserve {region7}
def_inst_site {tem_data_r[5]/opit_0} CLMA_21_373
def_inst_site {tem_data_r[1]/opit_0} CLMA_21_373 FF0
def_inst_site {tem_data_r[0]/opit_0} CLMA_21_373 FF1
def_inst_site {sel/opit_0_inv_L6Q} CLMA_21_373 FYD
def_inst_site {cnt[2]/opit_0_inv_L6QL5Q} CLMA_21_385
def_inst_site {ADC_inst/N12_13/gateop} CLMA_33_402 FYA
#def_port {pdata[0]} LOC=D20 VCCIO=1.2 IOSTANDARD=HSUL12 SLEW=FAST DRIVE=0.1 UNUSED=TRUE
#def_preserve {region2}
#def_region region2 13 19 66 67
```

Figure 4-41 after sorting

System comments are displayed first, and then in the following order

a. All def_port commands can be sorted by default string (port constraint)

b. All region declarations are sorted according to the region name, which is the default string sorting.

Position reservation command, the default string sorting is enough

c. All location constraints are first classified according to the device type, and under the same device type, they are sorted according to the name of the design instance.

d. The last comment is sorted after all the commands, and it needs to be sorted according to ASCII characters as a whole (in particular, because the user's comments cannot be distinguished here, it may appear sorted in Any position in the comment area, or the top, will not be interspersed with the middle of the command. The second special case is that when the device-related comment has been written to the beginning, the comment and the first line have been merged together when the tape is read. At this time, it will remain the same as before.)

e. Information that does not meet any of the above rules will be sorted to the back of the comment by default, and the original relative order will remain unchanged

4.12 Use of TCL commands

The commands currently supported by the PCE console are: constraint, unconstraint, region, save, select and editor.

4.12.1 Constraint related

(1) constraint command

constraint - design_instance - grid_dev_instance 【 -prim_dev_instance 】

or

constraint – design_instance 【–region】

Contents in square brackets indicate optional setting items.

Example:

constraint – design_instance aaa – grid_dev_instance CLMA_5_4

constraint – design_instance aaa – grid_dev_instance CLMA_5_4 FGA

constraint – design_instance aaa –region region1

constraint – design_instance aaa –region (2,4,5,9)

The above four commands are used to constrain the operation. The fourth command does not specify the region name, but gives a coordinate system. PCE will create a region based on the coordinate system. The coordinate system must be in the format of " (xmin,xmax,ymin,ymax) ". The created The region name is incremented in the order of region1 and region2.

(2) unconstraint command

unconstraint- design_instance

The above command is used to cancel the constraint.

It should be noted that if you want to constrain design_instance to the region, you must be in the Region Mode to succeed. If the design_instance name contains '【' and '】' characters, you need to use '{ }' to enclose the entire design_instance name, and use ';' to separate multiple design_instance names.

4.12.2 Region related

region command can be used to enter or exit the Region mode, and can also be used to create or delete a region.

(1) Command to create region

region –create –name –value

The above command is used to create a region, you need to give the region name and which coordinate area (xmin,xmax,ymin,ymax) you want to create the region. The first value of the value parameter is the start value of the x coordinate, the second parameter is the end value of the x coordinate, the third parameter is the start value of the y coordinate, and the fourth parameter is the end value of the y coordinate. The start value must be less than or equal to the end value, and both must be integers.

(2) Command to delete region

region –delete –name

The above command is used to delete a region. The region name to be deleted needs to be specified.

(3) Command to enter Region mode

region –in

The above command is used to enter Region mode.

(4) Command to exit Region mode

region –out

The above command is used to exit Region mode.

4.12.3 preserve command

(1) set_presetve command

set_preserve { device_instance_name ; }

or

set_preserve { region_name ;}

Example:

input the command:

set_preserve { CLMA_50_176 ; }

You can set the preserve attribute for the device instance

region1 already exists in Floorplan, enter the command:

set_preserve { region1; }

the preserve attribute on the area

(2) unset_preserve command

unset_preserve { device_instance_name ; }

or

unset_preserve { region_name ;}

Example:

input the command:

unset_preserve { CLMA_50_176 ; }

preserve on CLMA_50_176 can be canceled.

region1 already exists in Floorplan, and the preserve attribute has been set for region1, enter the command:

unset_preserve { region1; }

the preserve attribute on the area

4.12.4 Save PCF file related

(1) Command to save PCF file

After the constraint is completed, this command can be used to save the constraint file.

Command format:

save_constraint – file_name <PCF file name>

(2) The current PCE interface constraints save the pcf processing rules:

1) New constraints are incrementally added to the pcf file.

2) Modify Constraints Modify Constraints command on the basis of the original row.

3) Delete constraints comment out the customer constraints directly.

4) Comments in the original constraints file need to be preserved.

(3) Precautions

1) If there is already a PCF file in the current PCE window, the specified PCF path is automatically ignored and saved to the current PCF file. Regardless of whether the user specifies a detailed file path, a prompt message will be given to tell the user to save the changes to the current PCF file.

2) If there is no PCF file in the current PCE window, the following different results will be obtained by inputting different types of commands:

① Only input save_constraint, it will be saved as placement.pcf file by default in the current working directory.

PCF file is entered as a relative path, the relative path will be created and saved in the current working directory.

③ Only enter the suffix ".pcf " without a file name, and a prompt message will be given to tell the user to save in the correct format.

the suffix (.pcf) of the imported PCF file is incorrect, a prompt message will be given to tell the user to save it in the correct format.

⑤If there are illegal characters in the saved path or file name, a prompt message will be given to tell the user to save in the correct format.

3) If the given absolute path does not exist or fails when creating the path, save the PCF to the directory where the current project is located.

4.12.5 Select command related

Use the select command to select device_instance or design_instance for positioning.

Command format:

select – dev_instance

or

select – design_instance

e.g.:

select- design_instance aaa

select- dev_instance CLMA_5_4

4.12.6 Editor related

In PCE, editor can only be used to exit PCE, and the specific command is: editor –exit.

4.13 PCE Highlight function

4.13.1 Operation of device highlight on floorplanview in PCE

The operation of the device highlight on the floorplanview in PCE :

Step 1 : The user selects one (or more) devices in the floorplan view ;

Step 2 : The user right-clicks on the interface to select the HighLight Device, and selects the desired device from the HighLight Device. Set the color;

Step 3 : After the color is selected, set the highlight color of the corresponding selected device, and the newly set color will cover the previously set color;

Step 4 : Complete the interface display;

Select a floorplanview On the device, right-click in the right-click menu, select Highlight Device to select and set the color of the device you want to highlight (as shown in the figure below):



Figure 4-42 Unconstrained device highlighting

When there is a position constraint, the background color of the symbol corresponding to the constraint position will also be set to the corresponding Highlight color (as shown in the figure below):

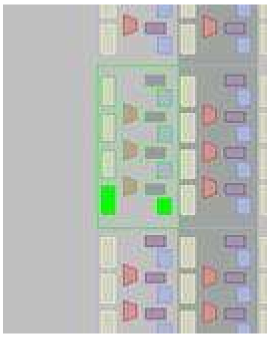


Figure 4-43 Constrained device highlighting

When the user needs to cancel one or more device colors currently set, just select these devices and right-click UnHighlight device.

For the set HighLight, we can right-click on the floorplan view and select Show Highlight Widget to select, cancel the highlight, change the highlight color and other operations on the device highlight we set.

4.13.2 Operation of design highlight on design browser in PCE

The operation of the design highlight on the design browser in PCE :

Step 1 : The user selects an item in the PCE design browser ;

Step 2 : The user right-clicks on the interface to select the Highlight Constraint, and selects the color he wants to set in the Highlight Constraint ;

Step 3 : After the color is selected, it will change the highlight color of the design with position constraints on the floorplan. If the corresponding Highlight color exists before the design, the newly set color will cover the previous color;

Step 4 : Complete the interface display;

Select an item on the design browser, right-click in the right-click menu, select Highlight Constraint to select and set the color you want to highlight (as shown in the figure below), and the position constraints made by the design on the floorplan view will be highlighted The highlight color of the corresponding position:

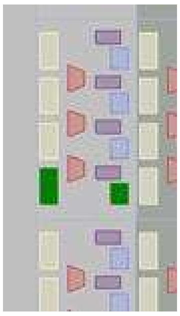


Figure 4-44 Design highlight

When the user needs to cancel the highlight color of a currently set design, he only needs to select

the item corresponding to the design on the floorplan view and right-click UnHighlight.

At the same time, for the HighLight that has been set, we can right-click on the floorplan view and select Show Highlight Widget to select the hightlight we set, cancel the highlight, change the color of the highlight, etc.

4.14 Export region function

When there is a Region area in PCE, right-click the menu on the floorplan view, and there is an option of Export Region on it. Clicking this option will pop up the floating interface of Export Region, and the user can set the export region constraints on the interface about APM and DRM 's regional constraints are converted into related configurations of location constraints. This configuration mainly has the following points: all regions or a specific region, setting the path for generating exports (Create Export Region Dir), setting the number of pcfs to start from Export (Start Position), the exported PCF is arranged and combined across several PCFs and then exported (Step), the total number of exported PCFs (File Number). These configurations will affect the content of the generated PCF. When the Region has not changed, it is required to turn off the PCE or PDS, etc., and then repeat the same operation. The content of the exported PCF must be the same as before.

Interface settings: When there are position constraints on the floorplan view of PCE, the export region option can only be selected in the right-click menu (right click anywhere on the floorplan view). This option is to assist the user to export the APM and DRM constraint information in the area to generate pcf under the specified folder. When there is no APM or DRM constraint in the region, the corresponding pcf cannot be exported. The relevant buttons are displayed as shown in the figure below:

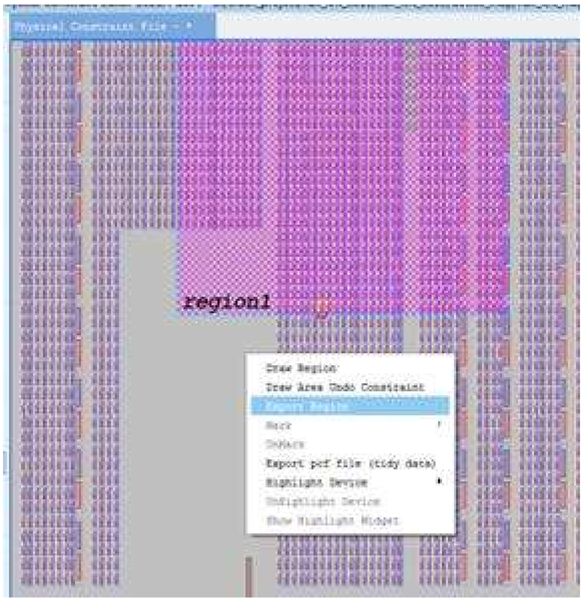


Figure 4-45 Interface region

After clicking the export region, the Export Region pop-up interface will appear. This interface is convenient for users to export some configuration options of pcf, as shown in the following figure:

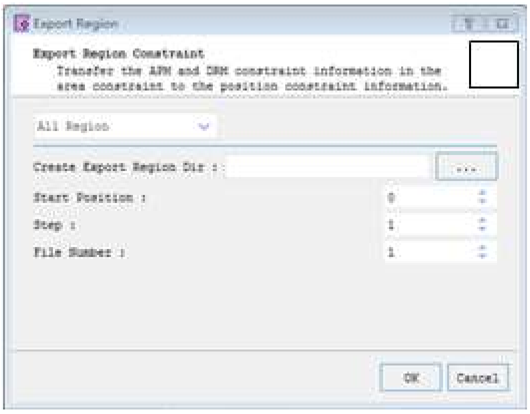


Figure 4-46 Export region window

【 All region 】 You can choose whether to export a single region or all regions

【 Create export region dir 】 The user creates a new folder to export the generated pcf file

【 start position 】 controls the output of pcf from the first permutation and combination, the minimum value is 0

【 step 】 Control the export of pcf across several permutations and combinations, the minimum value is 1

【 file number 】 Control the total number of output pcf, ps : A pcf file can be exported for a permutation and combination

After completing the corresponding settings in the export region configuration interface, the sub-threads will start to arrange and combine the devices and constrain the design inst to the devices, and a progress bar will pop up on the main thread to remind the user that the export region operation is in progress to assemble Other user operations, as shown in the figure below:

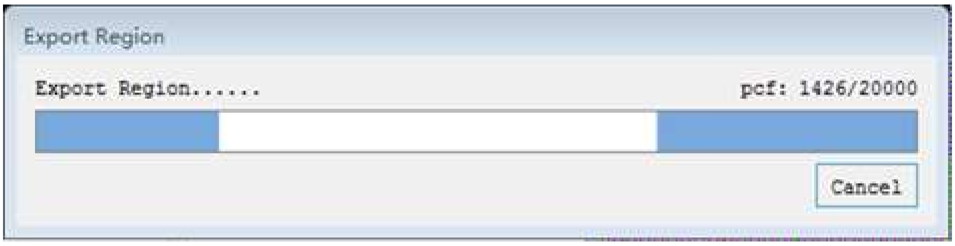


Figure 4 -47 progress bar

After the export is complete, you can find the corresponding pcf file at the created address.

5. CONTACTS

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